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No. XIII. OF VOL. I., 1931. LONDON, SATURDAY, MARCH 28, 1931 Pp. 120—Price 1s.

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ADDRESSES AND ORIGINAL ARTICLES

SOME LESSONS OF THE DISTRIBUTION OF INFECTIOUS DISEASES IN THE ROYAL NAVY.*

BY SHELDON F. DUDLEY, O.B.E., M.D., M.R.C.P.LOND., D.P.H., D.T.M.,

SURGEON CAPTAIN, ROYAL NAVY; PROFESSOR OF HYGIENE AT THE ROYAL NAVAL MEDICAL COLLEGE, GREENWICH.

LECTURE III.

THE HISTORY OF UNDULANT FEVER IN THE ROYAL NAVY.

IN recent years in various parts of the world undulant fever has become more common. Therefore a re-examination of the naval records of "fever" in the Mediterranean should have a special interest at the present time. An old naval health report, written in 1837, contains the following eulogy on Malta:—

> Malta on account of its central situation, its arsenals and the excellence of its harbours is the principal Naval Station. During nine months of the year the temperature is moderate, the weather being generally clear and fine, which, with the excellence of fresh meats and vegetables procured there, produces highly beneficial effects on the health, comfort, and efficiency of the naval force employed in the Mediterranean. The other three months are hot, sometimes in high degree; but either because it is not sufficiently long continued or because there is not morbific material for it to act on, the heat has not, except on very rare occasions, proved injurious to health.

Contrast this description with an opinion written in the report for 1883, when the fever-rate had risen to 181 per 1000, more than twice as high as that recorded in the 'thirties (84 per 1000):—

> "The causes of this considerable increase in the amount of paroxysmal fever are various; chiefly it appears due to a combination of causes at Malta. The ships, in which the largest number of cases occurred, refer nearly all their sickness to that harbour—which is about the most unhealthy place on this station and where we spend most of our time."

It is obvious that something must have happened in the interval to account for two such diametrically opposed views on the salubrity of the island.

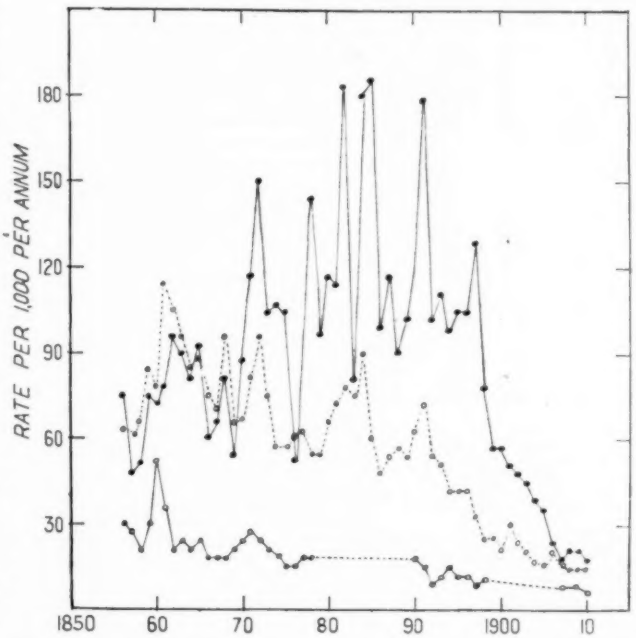
Perusal of the naval record for the early 'thirties fails to reveal a description of any disease that can be recognised as undulant fever. When the naval record reopens in 1856 the incidence of fever is lower than in the 'thirties, and the significant remark is made that, "the proportion of attacks of all kinds of fever—namely, 76 per 1000 of mean force—differs but little from the average rate in the Mediterranean Fleet for a long series of years."

For the seven years 1830 to 1837 the ratio per 1000 for fever on the Mediterranean Station was 84·0, with a case-fatality of 2·1 per cent. As a check that the tendency to contract fever under naval living conditions had undergone little alteration between 1837 and 1856 the West Indian statistics can be used. On this station the fever morbidity between 1830 and 1837 averaged 209·6 per 1000 per annum with a case-fatality of 5·3 per cent. Between 1856 and 1860 the corresponding figures were 223 per 1000 and 16·0 per cent. The high fatalities are due to yellow fever in the West Indies.

Therefore, prior to 1856 the incidence of undulant fever in the Navy cannot have been as great as it subsequently became.

Fig. 13 gives the incidence graphs of "total fevers," and two conditions which are sometimes confused with undulant fever—namely, "major" diseases of the lungs and rheumatism. The majority of infections due to *Brucella melitensis* are included in the upper graph, but a certain number, which must have varied at different periods, were diagnosed as phthisis, inflammation of the lungs, or rheumatism. The incidence of fever as recorded by the upper continuous lines in Fig. 13 remained relatively low till the 'seventies, and then rose; there were further great exacerbations of fever morbidity in the 'eighties. Mediterranean fever was not entered under a separate heading until 1897. This year coincides with a rapid fall in total fever incidence which continued, but at a slower rate, to the end of the period. The number of entries recorded as Mediterranean fever were halved between 1897 and 1900, and then remained level till the discovery of the usual means of transmission of brucella infection led to the prohibition of goat's milk. The incidence then fell practically to zero and remained there. Notice how the peaks on the graph representing the incidence of rheumatism frequently coincide with the peaks on the fever graph. The very first years that these graphs refer to are by far the most interesting. The excess of fever in 1856 over the next two years was caused by a single epidemic in H.M.S. *Hannibal*. In 1859 the fever and

FIG. 13.



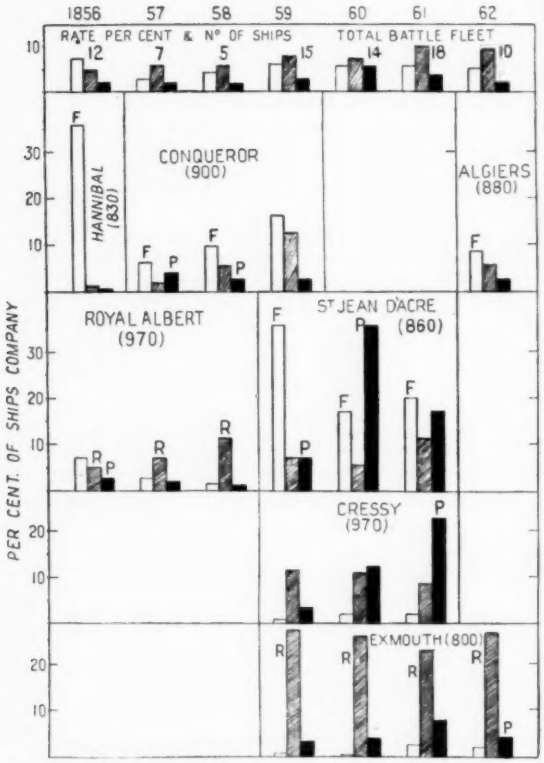
Illness in the Mediterranean Fleet. Top continuous line and dots = total fevers; interrupted line and circles = rheumatism; lower continuous line = major infections of the lung.

* The Milroy lectures delivered before the Royal College of Physicians of London on Feb. 26th, and March 3rd and 5th.

rheumatic incidence rise together. In 1860 there is a single sharp peak on the graph for "major" lung cases. To show this strange epidemic was the chief reason for introducing the graph of the incidence of pulmonary infections. This peak is found to be caused by an epidemic of pulmonary disease in H.M.S. *St. Jean D'Acre*. The next year, 1861, is a maximum for the incidence of rheumatism. The graph for rheumatic incidence remains above that of fever for the next two years. This phenomenon is again largely accounted for by a single ship, the *Exmouth*.

It would seem that in the Navy, prior to the late

FIG. 14.



Incidence of illness on various ships. Black columns = continued or remittent fever; shaded columns = rheumatism; white columns = major respiratory disorders. The ships with the maximum incidence of these illnesses during the year are indicated by the letters F, R, and P respectively. Rates are corrected for time. The numbers in brackets are the ship's complement.

'fifties, undulant fever can have given little trouble. The reports of these early years show that medical officers were puzzled and worried by the appearance of new clinical syndromes with which they were evidently unfamiliar. From 1856–58 the incidence of rheumatism, so constantly associated with undulant fever, was practically no higher in the Mediterranean Fleet than it was in the 'thirties, or on the Home Station in the 'fifties. When we read the careful clinical descriptions of fevers written by naval medical officers, such as Bryson[11] in 1847, it is unlikely, if undulant fever had been common in the Navy before 1856, that its appearance in the late 'fifties among seamen would have caused such confusion and perplexity. Marston's[12] classical description of undulant fever appeared in 1861. His clinical material largely consisted of troops returned to Malta from the Crimea. And it is a remarkable coincidence that undulant fever is first recognised as giving trouble in the ships which were used for transporting military invalids from the Crimea to Malta.

Undulant Fever as a Ship Disease.

Fig. 14 is intended to envisage the development of undulant fever as a ship disease between 1856 and 1862. These diagrams show the incidence of the three groups of infection, entered in the naval sick returns as "Continued and Remittent Fever" (white columns), "Rheumatism" (shaded columns), and "Phthisis and Inflammation of the Lungs" (black columns). These clinical categories each contained a variable proportion of brucella infections. The row of histograms along the top of the figure gives the average incidence of these groups of infection in each year, in the big ships of over 500 complement (the average complement per ship was 800). The yearly number of big ships in the Mediterranean is also given at the top of Fig. 14. Each of the seven ships represented produced, during one or more years, the highest incidence of one or more of the three groups of infection under discussion. The ship with the highest incidence of "fever," rheumatism, or pulmonary infection for any specific year is marked with an F, R, or P respectively. For example, in 1856 the *Hannibal* had the maximum fever incidence far above the mean. The maximum attack-rates for both rheumatism and pulmonary infection for that year were reported by the *Royal Albert*, but these rates were little more than expected from the average morbidities of the total battle fleet. With the help of this diagram it should be easier to follow the subsequent remarks.

In 1856 it was reported that the *Hannibal* suffered from an epidemic of "a low adynamic fever" which had continued over from the preceding year. This ship was employed carrying troops from the Crimea to the Bosphorus, and military invalids to Malta. The only other ship with fever of a similar type was the *Royal Albert*, but she only returned 68 cases of remittent fever in 1856 against the *Hannibal's* 243 (five deaths). The naval commentator of the 1856 report writes that "the prevalence of fever in the *Hannibal* for a period of two years can only be ascribed to the successive transmission of the disease by infection from one set of men to another; for the vessel herself, like every other ship of war, was kept scrupulously clean, and the crew were clothed, fed, and employed like the crews of the other vessels of the fleet." With regard to the *Royal Albert* it is narrated that the remittent fever she was suffering from declined, but was replaced by a fever of not much severity but "complicated with an inflammatory state of the bronchial tissue." This note is significant in the light of the subsequent pulmonary epidemic in the *St. Jean D'Acre*. The report goes on to say:—

> "As a proof that the fever in the *Hannibal* and *Royal Albert* was not occasioned by the climate nor by the state of the weather, another ship of the same class, the *Princess Royal*, lay in harbour at Malta, from the beginning of the year until the middle of April, and subsequently she entered the Black Sea, touched upon the shores of the Crimea and returned to Malta in June; yet during the whole period there occurred only three cases of fever, against 130 in the *Hannibal* and 30 in the *Royal Albert*. In the *Hibernia*, which lay moored at Malta during the whole year, there were only 16 (cases of fever), the average duration of which was six days each."

These remarks indicate that these fevers in the *Hannibal* and *Royal Albert* were unfamiliar to the naval medical officers of the time. The fact that the depôt ship at Malta passed a year without producing

any case suggestive of undulant fever would have been unbelievable after the 'eighties when Malta fever was rampant in the fleet. In 1857 and 1858 the Fleet as a whole was relatively free from fever. It is recorded, however, that the *Royal Albert* still suffered from a fever in 1857 similar to that experienced in 1856 (the *Hannibal* had gone home to pay off). In 1857 the *Conqueror* comes on the scene as the chief fever ship for this and the following year; she also had the highest incidence in the Fleet for pulmonary infections as well as fever.

CONFUSION WITH ENTERIC.

As regards the fever in the *Conqueror* we read that in 1858 another ship, the *Princess Royal*, suffered from an epidemic of fever which appears to have been typical enteric, with 30 cases and six deaths. The fever in the *Conqueror* is stated to have been generally similar to that in the *Princess Royal* with these differences—convalescence was more tedious, there was a tendency to relapses, there were few skin eruptions, and there were only three deaths out of 87 cases. The following year the number of fever cases in the *Conqueror* increased to 136 with four deaths, and moreover during the same time the incidence of rheumatism in her had more than doubled. The men dying of fever, both in the *Conqueror* and *Princess Royal*, showed ulceration of the bowels at autopsy. There is little doubt that the fevers in the *Conqueror* included some infections with *Bacterium typhosum* as well as brucella, but that the majority of these cases were enteric fever is excluded by the low case-fatality. The report that ulceration of the ileum was almost invariably found at post-mortem examinations is easily accounted for by the fact that enteric is a killing disease; only five cases are required to get a post-mortem, while on the average 60 cases of undulant fever are necessary for this purpose. Assuming clinical enteric fever showed its usual case-fatality, even if all the fever deaths in the *Conqueror* were due to *B. typhosum*, there could only have been 35 cases of enteric fever among her 223 cases of "continued and remittent fever." In fact, in those days the differential diagnosis between enteric and undulant fever was often only decided in favour of the former by the death of the patient. In 1859 H.M.S. *St. Jean D'Acre* arrives on the station and takes over the maximum incidence of fevers and pulmonary infection from the *Conqueror*. In her first six months the *St. Jean D'Acre* returned 153 cases between July and December, 1859, which were described as being "of a continued type tending to become remittent, and many assumed a typhoid character and one terminated in death." This is the first typical picture of an undulant fever epidemic—the low mortality completely excludes enteric fever. In 1860 and 1861 the *St. Jean D'Acre* still returned the greatest number of fever cases, until decimated with fever and pulmonary disease she was sent home in August, 1861. In 26 months the *St. Jean D'Acre*, with a ship's company averaging 880 men, returned 410 cases, diagnosed as remittent fever, equivalent to 22 per cent. of all the fever recorded in the battle fleet during 1859, 1860, and 1861. (During these three years the number of large ships averaged 16, and the mean total complement was 13,000 men.) During the same period the *St. Jean D'Acre* suffered an epidemic of pulmonary disease of equal magnitude to the remittent fever epidemic.

ARTHRITIS.

Definite arthritis and rheumatic sequelæ have always been associated with the Mediterranean type of undulant fever. From 1856–58 there was no excess of rheumatism in the Mediterranean Fleet. The incidence of rheumatism (12 cases) was negligible in the *Hannibal* but was the maximum for three years running in the *Royal Albert*, the only other ship reported to have a fever comparable to that in the *Hannibal*. But even in the *Royal Albert* and in the *Conqueror* in 1859 the incidence of rheumatism was not much above the mean, and drew no comment from the medical officers of the period. In the *St. Jean D'Acre* the rate for rheumatism was about the average for the total Fleet. But in 1859 rheumatism increased in prevalence, and a large proportion of this increase was due to an epidemic of rheumatism in H.M.S. *Exmouth*, which produced about three times her share of this disease four years running. Nevertheless, the number of cases of "continued and remittent" fever notified from this ship was only a fifth of that to be expected. It is, however, noteworthy that the *Exmouth* and also the *Royal Albert* returned a number of cases under the heading "catarrh and influenza" much in excess of the average, and many of these may possibly have been mild brucella infections. (In the *Royal Albert* the rate for "catarrh and influenza" was 293, against 156 for the whole battle fleet in 1856–58. In the *Exmouth* this rate was 228, the annual mean rate being 153 per 1000 in 1859–62.)

In 1861 the association of fever and rheumatism for the first time is noticed by the naval commentator who remarks: "Whether the fever present during the past and present year, which has been followed by rheumatic pains is a distinct species, or whether the rheumatic supervention was accidental there is no means of ascertaining." In the following year, 1862, a medical officer definitely refers to "the obstinate rheumatism consequent upon remittent fever." Again, it is obvious the medical officers of the Navy had not long been familiar with the rheumatic sequelæ of undulant fever. There is also another pertinent observation in the 1861 record, the author of which, in commenting on the sudden rise in the prevalence of rheumatism from 82 per 1000 in 1860 to 113 per 1000 in 1861, says: "The disease, in fact, appears to have taken the place of the bronchial infections which prevailed so generally in the squadron the previous year." If we accept the excess of these bronchial infections which occurred mainly in the *St. Jean D'Acre* and the *Cressy* as due to *Br. melitensis*, this remark has a certain significance. However, it is admitted that with an ordinary rate of 60–70 per 1000 for rheumatism on other stations, the lack of a consistent association between the rheumatic and remittent fever morbidity of individual ships, the known fact that ordinary rheumatism is so variable and probably has many causes, and the low incidence of remittent fever reported from the *Exmouth*, may make it appear rash to attribute her epidemic of rheumatism to brucella infection. Nevertheless, the parallelism of the total fever-rate with the rheumatic incidence, the well-recognised rheumatic complications and sequelæ of Mediterranean fever when it first became a well-established clinical entity, the observation that in the early 'sixties the ratio of rheumatism to continued and remittent fever was twice as high in the large ships of the Mediterranean as in those of the West Indies (i.e., 1·5 and 0·8; see Fig. 4), and the inability to discover any comparable epidemic of rheumatism on any other naval station between 1856 and the present day, make brucella infection the most likely cause of the epidemic of rheumatism in the *Exmouth*. In three years the *Exmouth* reported 580 cases of rheumatism out of her ship's complement of 800 men. Of course, many of these entries on the sick

list may have been readmissions of the same individuals. The rheumatism in the *Exmouth* puzzled the naval medical officers of the time, who also report that these cases were generally subacute, but very intractable, and that many had to be invalided home.

PULMONARY SYMPTOMS.

There are no descriptions of "fever" that can with certainty be recognised as brucella infection in the 1860 report. The *St. Jean D'Acre*, as previously mentioned, returned the maximum number of remittent fever cases, but in addition she suffered from an astonishing epidemic of pulmonary disease. During the 26 months she was on the station, 416 of her crew, averaging 880 men, were diagnosed as cases of "phthisis" or "inflammation of the lungs." H.M.S. *Cressy* suffered from the same peculiar disease to a less degree. This is what the report of 1861 says of this outbreak:—

"It thus appears that seven vessels lost more than double the number of men by invaliding for phthisis in 1860 than in 1861, though the disease which appeared to be peculiar to the *St. Jean D'Acre* and *Cressy* did not exist in epidemic form in any other vessel; why the loss in other vessels was so large was shown in last year's report to be due to the disease attacking men sent to Malta Naval Hospital for treatment for other complaints; in fact so many men were attacked in this establishment, one of the most perfect in the naval service that, as previously mentioned, there were just grounds for believing the disease which first developed in the *St. Jean D'Acre* had acquired the power of propagating itself in the well-ventilated wards of the hospital."

Of 285 cases which were recorded in 1860 in this ship, 102 were definitely diagnosed "phthisis" and 117 "cachexia pulmonis"; 112 of these were invalided home but only six died. The low fatality (3 per cent.) excludes these cases being attributed to infection by *Bacillus tuberculosis* or *Streptococcus pneumoniæ*. (Tubercle of the lungs was a fatal disease at this time. In the two years 1856 and 1857, before this strange disease appeared, 54 cases of phthisis were reported from the whole Mediterranean Fleet, and 26, nearly half, died.) Moreover, it is expressly stated the peculiar thing about this epidemic phthisis in the *St. Jean D'Acre* and *Cressy* was that the cases quickly recovered on their return to England—a characteristic of the pulmonary complications of Malta fever seen in more recent years.

Spread of Infection.

There is further evidence that this disease was spread in the ship, for place, climate, and food-supply may be said to have been controlled by H.M.S. *London* (810 men), sister ship to the *St. Jean D'Acre*, who kept company with her nearly the whole three years this epidemic was in progress. The *London* recorded 54 pulmonary cases during these three years, 12 of which were diagnosed "phthisis." The epidemic was attributed to bad ventilation between decks. The following is a description of the lower deck in the *St. Jean D'Acre* as written in 1860:—

"All the ship's company amounting to about 930 men, with the exception of the cooks and about 40 boys, slept on this deck. The hammock hooks were placed ordinarily at only 14 inches apart—less than the average breadth of the men's shoulders; consequently, while in harbour when no watch was required at night, and all hands had turned in, they formed a compact mass close beneath the beams, the only air available for respiration being above them, that beneath the hammocks being almost entirely shut out from the space above. All the ports as well as the small round scuttles were kept closed at night; the small square central scuttles were, however, ordered to be kept open, though on account of the cold wind which came through them they were frequently closed by the men who slept next to them. The hatches were covered with gratings, but sometimes the open spaces in the gratings were accidentally obstructed with lumber. The only means of admitting fresh air were three windsails leading down to the cockpit, which it was difficult to keep properly trimmed, and in calm weather they, of course, were entirely useless."

It is further stated that the temperature of the air above the hammocks was sometimes 12° F. higher than the temperature below them.

POSSIBILITY OF DROPLET INFECTION.

Although the conditions in the *St. Jean D'Acre* could have differed little from those in other ships of the period, they were ideal for the development of an epidemic of pulmonary disease once the infection had gained a sufficient start. And it would seem that in this environment *Br. melitensis* had acquired the power of spreading by droplet infection. The power once acquired, this unusual form of pneumonic undulant fever became temporarily able to spread by droplet infection in the relatively spacious wards of the Malta Naval Hospital. If this hypothesis is true, this pulmonary form of brucella infection presents an analogy to pneumonic plague. In the overcrowded Manchurian inns, an atmospheric environment which is not unlike the lower deck of the *St. Jean D'Acre*, *Pasteurella pestis* acquires the power of spreading by droplet infection instead of through the skin. Moreover, in the common pneumonic complications, either *secondary* to plague inoculated by fleas or *secondary* to undulant fever contracted from infected milk, the respiratory spray of the patients seems relatively non-infectious, as compared with the droplet-infected *primary* pneumonic infections. Broncho-pneumonia and signs in the lungs are a common complication of ordinary Mediterranean fever and can simulate phthisis with remarkable accuracy. For a physician of the present day I have a fair clinical and bacteriological experience of Mediterranean fever yet, within the last year or so, I was completely deceived by a pulmonary case of undulant fever.

A boy, a typical red-headed tuberculous-looking Irish recruit, who had never been further from Donegal than Portsmouth, was admitted to my care with hectic temperature, lymphocytosis, night sweats, and signs in his lungs which suggested tuberculosis. I was so anxious about him that I sent for his parents from Ireland and gave them a hopeless prognosis. To my astonishment the fever subsided, the boy seemed almost well, when another wave of fever started. The temperature chart took on a familiar appearance, and it was obviously time to test his blood serum which, diluted over 1000 times, agglutinated a suspension of *Br. melitensis*. The boy had another wave of fever and made an uninterrupted recovery.

The source of this boy's infection is only speculative. But brucella infections have occasionally been seen in the naval hospitals in men who had never been out of England, and the most probable source of such infections are urinary carriers returned from the Mediterranean. In the light of this experience I do not think there need be much hesitation in accepting this epidemic of phthisis and pneumonia of the 'sixties as one of pulmonary undulant fever, even if one does not care to believe the mode of transmission was "droplet infection." Nevertheless, the possibility of droplet infection is not to be lightly dismissed. Although the bacteriological investigation of the sputum of suitable cases has been rather neglected, yet *Br. melitensis* is reported to have been recovered "in almost pure culture" from the sputum of patients resembling clinical phthisis which were seen in an epidemic of undulant fever at Naples.[13]

The eradication of undulant fever from the fighting services by the prohibition of goat's milk has fostered a false conception that other methods of transmission are negligible, though Bassett-Smith [14] always insisted

on the importance of other sources of infection, and drew attention to the danger and frequency of the mild ambulant case and urinary carrier of *Br. melitensis*. It almost looks as if epidemiologists had been mesmerised by the success of the great Maltese experiment, since it is only recently that field investigators are awakening to the fact that bovine and porcine varieties of undulant fever are as frequently contracted from other sources as from milk. The authors of one of the many recent papers on this subject which describes the epidemic of undulant fever in Iowa, U.S.A., conclude by saying:—

"The data presented make untenable the opinion that the ingestion of raw dairy products from infected cows is the only means of transmission of undulant fever. It is apparent in Iowa, at least, that approximately one-half the cases result from a second means of transmission—namely, through contact with infected animals, their tissues and discharges, the infection in all probability entering through the skin." [18]

Clinical and Parasitic Types.

The evidence in these early naval reports suggests that undulant fever was then generally a sporadic disease in the Navy which was contracted ashore most probably from the consumption of raw dairy products. Usually it did not spread to other men on board, but, if conditions were favourable, brucella was transmitted from man to man via food, droplet infection, or even directly through the skin. Once the reservoir of infection on board was large enough a protracted epidemic affecting half a ship's company could materialise. Though extensive single-ship epidemics may have been relatively infrequent, when they did occur they caused a great increase in the naval morbidity which is reflected in the magnitude and irregularity of the yearly oscillation on the chart of total fevers in the Mediterranean (see Fig. 13). The ban on goat's milk prevented the infection being transplanted from the shore to ships where the environment was suitable for direct transmission. Fig. 14 gives examples of such brucella-infected ships, but it also shows another interesting phenomenon. There seemed in these early years to have been three clinical varieties of brucella infections, the first tending to produce a febrile, the second a rheumatic, and the third a pulmonary clinical picture. On this hypothesis the *Hannibal* suffered from the first type only; in the *Royal Albert* the brucella strains were developing rheumatic-producing properties, while in the *Conqueror* they became "pneumogenic." These clinical types reach the acme of development in the *St. Jean D'Acre* and the *Exmouth*; the former being infected about equally with the febrile and pneumonic varieties, while the *Exmouth* specialised in the former to the exclusion of the other two. The *Cressy* is remarkable as a ship where the ordinary type of fever was practically absent, having been replaced by the pulmonary, and to a less extent by the rheumatic types of brucella infection. Notice, moreover, how Fig. 14 envisages the striking way these clinical varieties bred true from year to year in the same ship.

A parallel to these clinical pictures of brucella infection can sometimes be seen in influenza epidemics, where several ships in one squadron will each have its own "species" of illness. When such phenomena are observed ashore there is seldom any indication that the variation in a clinical picture is not wholly secondary to differences in herd-immunity or environment. In these ships any differences in these latter factors could scarcely have been significant. Therefore, if the epidemics in the *St. Jean D'Acre* and the *Exmouth* were both caused by *Br. melitensis*, it can be assumed with some confidence that the marked variation in the clinical pictures were secondary to differences in parasitic qualities. In those days the classification of disease was based on clinical grounds only and pathogenic bacteria had yet to be discovered; hence brucella infection would naturally and rightly be classified according as arthritic, pulmonary, or febrile symptoms dominated the clinical picture. In the *Exmouth* the majority of cases of what would to-day have been called undulant fever probably had definite arthritis. It was therefore obviously more rational to classify them under rheumatic, rather than under remittent, fever. Similarly, many of the brucella infections in the *St. Jean D'Acre* may have had rheumatic symptoms in addition to pulmonary lesions. But, the latter being most in evidence, these cases were recorded correctly as "inflammation of the lungs," and, as a result, the reported incidence of rheumatism in this ship was not above the average.

In the 'fifties and early 'sixties the clinical thermometer was not in general use, and the characteristic temperature charts, common to all varieties of the Mediterranean type of undulant fever, was unknown. By 1872 the use of the thermometer was routine, and in this year there is a detailed account of the protracted nature of the "Mediterranean remittent." The surgeon of H.M.S. *Caledonia* describes a series of cases which averaged 90 days apiece on the sick list. This officer (Staff-Surgeon J. Cotton) is also the first to record the observation, frequently confirmed in later years, that Mediterranean fever in some ships showed a greater tendency to attack officers than ratings (20 per cent. of the *Caledonia's* officers got "remittent fever" as against 3 per cent. of the "lower deck"). The greater apparent susceptibility of officers was by no means a general rule. In the big single-ship epidemics previously discussed, such as those in the *St. Jean D'Acre*, it is specifically mentioned that the officers seemed immune. The cause of this reversal in the relative immunity of officers and men is explained by the two modes of transmission. When brucella was disseminating directly from man to man in such an environment as that of the *St. Jean D'Acre's* lower deck, the officers were protected in their separate cabins and more spacious quarters. Fresh milk was essentially a wardroom luxury; the men did not get milk on board, and probably rarely drank goat's milk ashore during the first half of our period. Hence, unless the infection was spreading directly in the ship, officers were more frequently infected with brucella than men.

It is an interesting speculation how far the comparative freedom of the Navy from undulant fever before the 'fifties, and the subsequent rise in morbidity through the 'seventies and 'eighties, was due to an increased use of raw dairy products by the sailor.

Incidence of Undulant Fever.

From 1862 until 1878 there was no ship epidemic comparable to those just described, but in this year two ships, while at Cyprus, returned 236 cases of remittent fever, 20 per cent. of which were stated to be of that type known as "Malta fever." Incidentally, it may noted that, prior to 1882, the fevers in the Mediterranean Fleet appear to have been as often contracted at the Eastern end of the station as at Malta. The coast of Syria is specifically mentioned as an endemic locality for "the remittent fever characteristic of the Mediterranean." There is no intention of suggesting by this remark that undulant fever had not been endemic in Malta from times of antiquity, but only that either the degree of endemicity

was highly variable or, owing to their habits, seamen did not become so often infected before as after the early 'eighties. In the period covered by Marston's famous report [12] on Malta fevers there is no doubt undulant fever was common among the "shore-going" inhabitants of the island both British and native. Also some figures quoted in the report indicate that the incidence of total fevers was about three times as great in the Malta garrison as in the Mediterranean Fleet in the period 1856–59. However, Marston's description of his "ephemeral fever" cases is almost as good a drawing of the clinical picture of sandfly fever as his account of the "Mediterranean remittent" is of undulant fever. For obvious reasons sandfly fever in Malta has always been much more prevalent among soldiers than sailors. Therefore some part of the excess of fever morbidity in soldiers was undoubtedly due to sandfly fever. (In 1928 the military garrison of Malta recorded its maximum sandfly fever morbidity of 117 per 1000 in the same year as the Mediterranean Fleet reported 4·3 per 1000.) Undulant fever seems to have been increasing in the garrison during the 'fifties because Marston himself states he had the impression in 1859 that fevers on a whole had become more protracted. It is probable, therefore, that in spite of occasional extensive ship epidemics and the prevalence of sandfly fever ashore swelling the total fever morbidity of soldiers, the Army in the 'fifties did suffer more severely than the Navy from undulant fever.

In 1882 there was a great exacerbation of enteric fever and undulant fever in the Fleet. The former was partly secondary to military operations in Egypt (27 deaths and 71 invalidings are attributed to enteric fever in 1882). The increase in Mediterranean fever, however, was due to two ship epidemics which together account for 42 per cent. of the total "remittent fever" morbidity. One of these ships, H.M.S. *Superb*, produced 136 cases, 77 of which were invalided home and one died, typical undulant fever figures. Her medical officer gives some interesting information concerning the spacial distribution of these fever cases in the ship.

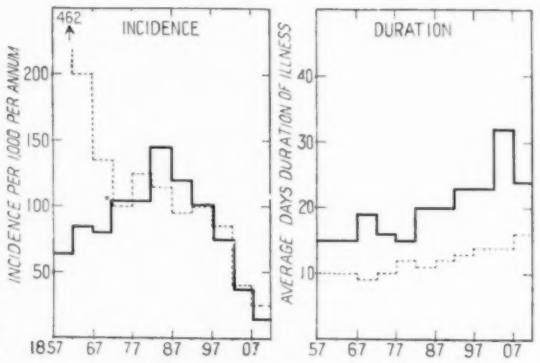
> The ratings in the *Superb* slept on three decks. The flying deck was a kind of huge shelf cutting part of the lower deck horizontally in two, it was the worst ventilated sleeping space with the lowest cubic space per man. Twenty-nine per cent. of the men (140) sleeping on the flying deck got fever as against 17 per cent. of the men (196) on the lower deck, and 10 per cent. of those (250) who slept on the relatively spacious and better ventilated battery deck.

This correlation of morbidity with density of population and deficiency of ventilation is again more consistent with a droplet-borne than a milk-borne infection. Ventilation greatly improved in the 'eighties, and "remittent fever," though as prevalent as ever, appears to have been more evenly distributed throughout the Fleet, but the statistical returns after 1878 no longer tabulate the incidence of specific diseases in separate ships. The big peak in 1891 on the graph of total fevers (Fig. 13), which is also accompanied by a large rise in the rheumatic morbidity, was apparently caused by a single epidemic of undulant fever in H.M.S. *Trafalgar*, who returned 268 cases of "fever" about which no details are given. There is little else of interest to note in the naval reports until the dramatic experiment of 1906, whereby the order prohibiting the use of goat's milk, eradicated undulant fever from the Imperial Forces, leaving the civilian incidence of Malta fever unaffected to control the experiment. And thus Malta was changed, from being a dreaded fever centre, back once more to the pleasant naval health resort which the island was reported to be in 1837.

A COMPARISON WITH CHINA.

An attempt will now be made to get some idea of the incidence of undulant fever in the earlier part of our period by examining the statistical data of the fevers in the Mediterranean Fleet between 1857 and 1913. It is as well to first compare the Mediterranean with another fever-producing station. Fig. 15 compares in five-yearly periods the morbidity and mean duration of illness from fever on the China and Mediterranean stations. The period opens with the Chinese wars. As is usual when the Navy goes ashore there was a tremendous incidence of fever in the China squadron. In the Mediterranean the incidence rises till the 'eighties with the development of undulant fever. The great fall in fevers which took

FIG. 15.



Incidence of total fevers (1857–1912). Continuous lines = Mediterranean; dotted lines = China station.

place on both stations in the 1902–06 quinquennium coincides with the elucidation of the mode of transmission of malaria and the increased proportion of large ships in the Fleet. It is noteworthy that this fall in malaria took place prior to the control of Malta fever, so that the fall corresponds to the great rise in the mean duration of total Mediterranean fevers between 1902 and 1907 (B. Fig. 15). The mean duration of fevers on both stations tends to increase but the increase is greater in the Mediterranean, where the average duration of fever has always been longer than on the China station, owing to the presence of undulant fever, and to the greater ratio of enteric to other fevers, on the Mediterranean station. The higher relative prevalence of enteric is also confirmed by the fact that up till 1897 the case-fatality for total fevers was on the average twice as high in the Mediterranean as in the China squadron.

PREVALENCE IN THE MEDITERRANEAN.

Table IV. gives some details of the fevers on the Mediterranean station between 1897 when undulant fever was first given a separate heading in the naval returns until its control in 1906. The Table suggests one or two ways of getting a rough estimate of the incidence of undulant fever before 1897. Theoretically, if case-fatality was constant and enteric incidence known, one should be able to calculate the incidence of undulant fever, because these two fevers are responsible for almost all the mortality. But the case-fatality of undulant fever is too small and variable for this method to tell us much. On the other hand, owing to the constancy and magnitude of its case-fatality, mortality is a good guide to the prevalence of typical enteric fever. Table IV. suggests

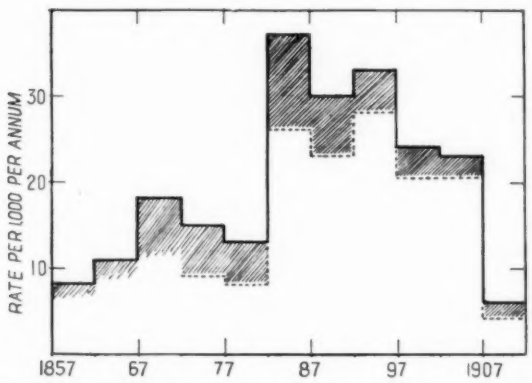
two other ways of obtaining a rough idea of the relative prevalence of undulant fever in the periods before it was given a separate name in the nosological returns. Practically all invaliding from "fever"

TABLE IV.—*Fevers: Mediterranean Fleet.*

1897 to 1906. Fevers diagnosed as—	Cases.	Days sickness.	Died.	Invalided.	Average duration.	Case-fatality.	Per cent. invalided.
Undulant	3,100	147,830	51	1,718	48	1·7	55
Enteric	478	28,341	105	188	60	22	39
Malaria	955	12,398	1	33	13	—	—
Continued	3,655	31,343	2	27	8·5	—	—
Total fevers ..	8,188	219,912	159	1,966	27	1·9	24
Undulant and enteric (long)..	3,578	176,171	156	1,906	49	4·4	53
Other fevers (short)	4,610	43,741	3	60	9·5	0·1	1·4

was caused either by undulant or enteric fevers. Therefore the incidence of total invaliding, less invaliding for enteric fever, will give the loss due to undulant fever which, if the standard for invaliding home had not greatly changed, should be about half the incidence. The second method of gauging the prevalence of Malta fever, which probably gives the best approximation to the truth, is by using the average duration of illness. Table IV. shows that it is possible to divide the "total fevers" into two classes—a "long" fever group of about 50 days' mean duration consisting of enteric and undulant fever only, and a "short" fever group of roughly 10 days' duration which comprises all other fevers. If it is assumed that the mean duration of the fevers in these groups did not vary significantly since 1857,

FIG. 16.



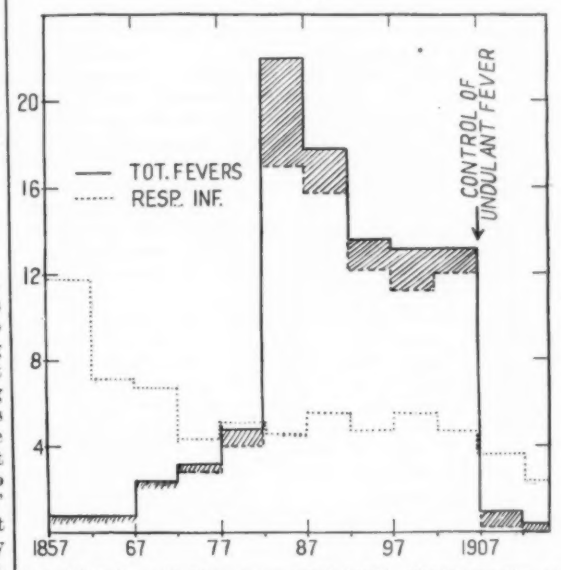
Incidence of "long" fevers (1857–1912), assuming that total fevers contain two groups averaging 10 and 50 days' duration. Shaded areas = enteric fever, as recorded; white areas = rough estimate of undulant fever.

then the incidence of "long fevers" during any period can be approximately calculated from the incidence and mean duration of total fevers in the same period. And if the incidence of enteric fever which has been recorded separately since 1872 is then subtracted from that of the "long" group, a rough approximation of the prevalence of undulant fever can be obtained.

For example, take the figures in Table IV. There are 8188 total fevers with a mean duration of 27 days each. Call the duration of "long" and "short" fevers 50 and 10 days respectively, and let x be the number of long, and y the number of short fevers. Then $x+y=8188$, and $50x+10y=27\times8188$; whence $x=3500$ cases of "long" fever.

Fig. 16 is a diagram of the long fever incidence calculated in this way. The shaded area in the polygon represents the fraction of long fevers due to the recorded enteric morbidity.

FIG. 17.



Invaliding from Mediterranean (1857–1912). Shaded portion of continuous polygon represents enteric invalids; the remainder may be taken as undulant fever invalids.

In the first three periods enteric morbidity was not distinguished separately in the returns. However, because the recorded morbidity of the total fevers and the average estimated incidence of "long" fevers were both less, and because the total case-fatality was about the same in these three earliest periods as in the succeeding one, therefore the proportion of enteric infections among the long fevers of 1857 to 1872 can hardly have been less than in the period 1872 to 1877.

Therefore the unshaded area of the polygon is the incidence of undulant fever, as suggested by the mean duration of total fevers. The diagram shows the same sudden rise in the incidence of undulant fever as was seen to take place in that of total fevers (see Fig. 13). According to this estimate the incidence of undulant fever was trebled between 1862 and 1882. This inference is confirmed by a similar graph made from the invaliding returns. Fig. 17 is this graph. The fraction of invaliding caused by enteric fever has been shaded, and therefore the unshaded portion represents Malta fever invalids. The general shape of this diagram is striking in its similarity to the preceding one (Fig. 16), but makes the sudden rise in the incidence of long fevers in 1882 even greater. According to Fig. 17, if the proportion of cases invalided was the same before and after 1882, then there would have been a fourfold increase in the prevalence of undulant fever. It is more than probable that the increase which the invaliding rates suggest was exaggerated by a rather sudden realisation that the best treatment for Malta fever was to send the patient home. It must be remembered that in those days the victim of a brucella infection was sent to

hospital where his staple diet generally consisted of cultures of the infecting organism in goat's milk. This form of vaccine treatment does not seem to have been successful and may have originated the dictum that Malta fever could not be cured in the island, though to-day cases of undulant fever do quite well in Malta Naval Hospital. On the other hand, as is shown by the graph of invalidings for respiratory disease, there was no hesitation in sending a man home in the 'sixties and 'seventies if his condition indicated it to be desirable; and I believe another factor in the magnitude of this sudden rise in Malta fever invaliding is that, prior to 1882, cases did more often get well in Malta hospital because the milk was not then so often or so intensely infected with *Br. melitensis*. Therefore the rise in the morbidity of undulant fever may not have been as great as the invaliding rate suggests. On the other hand, the rise in enteric invaliding is still greater and, since this is so, the rise in the total mortality from fever should also have been proportionately greater than that of total invaliding. As a matter of fact the fever mortality was only doubled in this period. Therefore part of the increase in invaliding from undulant fever might have been secondary to more frequent contamination of the hospital milk with *Br. melitensis*. The same hypothesis probably also explains the increased percentage of enteric fever cases that were sent home after 1882. Such cases arrived in hospital infected with *B. typhosum*, but many left infected with *Br. melitensis*. A platitude which was commonly used in the Mediterranean Fleet prior to 1906 was the remark that—if you went to hospital with a broken leg you were bound to go home with Malta fever. In this connexion, and as a remarkable instance of Marston's clinical acumen, in 1859 he advised against the use of goat's milk as a routine diet for Malta fever cases, since he had noticed such patients did not do well on it.

The Egyptian war of 1882 was responsible for an influx of emigrants into Malta from the Eastern Mediterranean, and some writers of the time attributed the coincident rise in fever to the overcrowding of the island which resulted. The naval records suggest that either new strains of *Brucella* had been introduced into the island about this time or the reservoir of the existent infections had become enlarged.

Fig. 17 also shows a dotted graph of the incidence of invaliding for "phthisis and inflammation of the lungs." The high rate in the first period was caused by the epidemics, previously described in the *St. Jean D'Acre* and *Cressy*, but invaliding for pulmonary disease remained high for the next decennium, suggesting that the pulmonary type of brucella infection was more common throughout the 'sixties than subsequently. It is noteworthy there was no rise in the invaliding for pulmonary disease corresponding to the great rise in fever invaliding in 1882, which indicates that the pneumonic type of brucella infection was becoming relatively more infrequent.

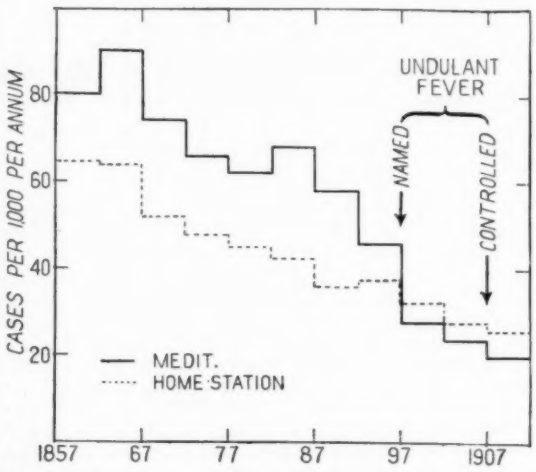
The eradication of Malta fever in 1906 is followed by a drop in the invaliding rate for respiratory disease which indicates that a certain number of brucella infections, right up to 1907, were still recorded as phthisis.

The Rheumatic Complications.

When the yearly incidence in the Mediterranean (Fig. 13) of the total fevers and rheumatism were plotted out together it was seen how the peaks on the two graphs frequently synchronised. If a certain fraction of this rheumatic incidence was due to brucella infection, it would be expected that the excess of rheumatic incidence would be proportional to the morbidity of undulant fever. However, ordinary rheumatism was becoming rapidly less prevalent all through the period (Fig. 9). In order to get a rough idea of the expected incidence of rheumatism, irrespective of brucella infections, the figures for the Home Station were superimposed on a graph of those for the Mediterranean Fleet (Fig. 18).

The dotted graph of the Home Station falls in a constant slope from 64 to 26 per 1000. The former figure is approximately the same as that for the Mediterranean in the 'thirties, and in 1856 and 1857. In five-yearly periods, the Mediterranean rate remains about 20 per 1000 in excess of

FIG. 18.



Incidence of rheumatism in the Mediterranean and on the Home Station (1857–1912).

the Home rate until 1892. There is a special exacerbation of rheumatism in the period 1882 to 1887, which corresponds to the sudden rise in undulant fever during this time. This rise is much less, however, than would have been expected if the excess of rheumatism had remained proportional to the incidence of undulant fever as estimated in the two diagrams (Figs. 16 and 17). In 1892 the incidence of rheumatic disease declines faster in the Mediterranean than at Home, and from 1897 onwards there is relatively less rheumatism recorded on the former station than from the Home Station. The acceleration in the decline of rheumatism started 15 years before the control of undulant fever. And, during this period, the recorded incidence of total rheumatism declined faster than undulant fever.

The excess of rheumatism in the Mediterranean was attributable to two sets of cases. First, acute undulant fever mistakenly diagnosed as rheumatic fever, and second, the sequelæ of recognised Malta fever infections which were re-entered on the sick list as "rheumatism." Improvement of, or fashion in, diagnosis might tend to diminish the number of cases recorded in the first group but would not affect the second. Therefore the disappearance of the excess of rheumatism from the Mediterranean Station, which anticipated the abolition of undulant fever, could have been caused by a falling off in the proportion of brucella infections which were accompanied or followed by rheumatic symptoms.

In my own clinical experience of undulant fever I have always been puzzled by the stress older practitioners laid on the pain and arthritis, and the difficulty in controlling it. Some of these physicians have stated that in spite of the protracted nature of the illness, they were often compelled to resort to morphia. I have never prescribed morphia for a patient with

undulant fever, and have been surprised at their general freedom from pain. On the average the patients I have seen complained of less discomfort than the ordinary case of influenza. In the report of undulant fever in Iowa [16] due to the *abortus* or *suis* varieties of brucella the authors say—"In many cases the physician was much impressed by the patients' lack of pain, . . . we have encountered no case in which this diagnosis (i.e., rheumatic fever) had been considered. The striking absence of any physical abnormality of the joints probably explains this." These authors admit, however, "there may be real difficulty in the differential diagnosis of brucella infection and pulmonary tuberculosis." The bovine and porcine types of undulant fever seem otherwise no less protracted and severe than the caprine type as seen in the Navy. The average duration of the illness of 300 patients in Iowa was 90 days, about twice the mean duration of the brucella infections diagnosed in the Mediterranean Fleet. However, owing to the unfamiliarity of local physicians with brucella infections and the wide dispersal of the cases, the majority of mild infections of short duration must have been missed in Iowa. This would not happen in naval practice in the Mediterranean where every case of fever comes under observation and every medical officer is on the look-out for undulant fever.

It might be inferred that owing to some unknown factor common to all diseases, such, for example, as the improved dietary of the Navy, the tendency of specific infections to get rheumatic complications had diminished in parallel with the mysterious decline of ordinary rheumatism. This may be so with some infections, and perchance with brucella infections. This hypothetical common factor is, however, not at work on all rheumatic complications.

In the case of the rheumatic complications of gonorrhœa, as judged by the invaliding rates, there has been no amelioration in the Navy of the rheumatism-producing tendencies of the gonococcus, which are greater now than 30 or 40 years ago, in spite of the alleged improvement in the treatment of gonorrhœa. Most invaliding for gonorrhœa is due to rheumatism. (From 1887–96, 1·0 per cent. of gonorrhœa cases were invalided, from 1904–13, 0·8 per cent., and 1923–27, 1·8.)

So as far the evidence goes the decline in the rheumatic complications of brucella infections is more likely attributable to changes in the characters of the parasitic than of the host or the external environment.

Conclusion.

The lesson taught by these naval reports is that undulant fever was relatively uncommon in the Navy before the late 'fifties, from which time its importance as a naval disease slowly increased until 1882 when the incidence suddenly must have become at least doubled. Though it is probable that in early days undulant fever was first introduced into the ships by men who had drunk infected goat's milk ashore, much infection was transmitted directly from man to man without the intermediary of the goat. Just as I maintain that there would have been an adequate description of Malta fever by naval surgeons long before 1860 if it had been common in ships, Theobald Smith [17] points out that the great recrudescence if not first appearance of the *Br. abortus* type of undulant fever about 1922 in the United States cannot be explained by the disease having totally escaped the notice of the American physicians. Yet, since *Br. abortus* has been known to be frequently present in cow's milk since 1897, something must have happened to increase its pathogenicity for man between that date and 1922. Either these brucella infections in cattle were derived from imported caprine strains or the bovine variety had increased its infectivity for man by passage through the pig or the goat. The condition of affairs in Porto Rico to-day, reported by Otero,[18] is consistent with some such hypothesis. An exhaustive search failed to establish any definite human case of undulant fever in a country with an exceptionally high infection-rate of *Br. abortus* in cattle. Moreover, in Porto Rico experiments on 40 volunteers indicated that the strains of *Br. melitensis* var. *abortus* which were used were practically non-pathogenic to man except in colossal doses (seven broth cultures via the mouth—less, via the broken skin). I think the most generally accepted view to-day is that the "brucellæ" are one interchangeable species, the characters determining the varieties known as *melitensis*, *paramelitensis*, *suis*, and *abortus*, being impressed on the organism by the species of host which they have been recently inhabiting; and one wonders if the striking difference in the clinical picture of brucella infection in the Navy of the 'fifties and 'sixties as compared with the present century was not due to the more frequent passage of *Br. melitensis* from man to man without the intermediary of another animal—in fact, the attempt of an occasional parasite of man, which had wandered out of its specific host, the goat, to adapt itself to a purely human environment.

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THE COMPARATIVE ASPECT OF GROWTH IN CHILDREN.*

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GROWTH in the true sense of the word includes more than mere change in size and form. It includes that gradual development from the ovum to old age which involves the acquirement of new functions and fresh responses to the environment by the unfolding of new patterns of behaviour. The mere morphogenetic aspect of growth of the older anatomists is inadequate, and room must be found for concepts which are on the one hand physiological and psychological, on the other physico-chemical. Our real interest in children is not determined by their anatomy, but by their changing activity and behaviour as they pass from one developmental stage to another. The gardener's autumn starts with the wilting of the first snowdrop. The death of the individual starts with the shedding of the first ectodermal cell in the developing ovum.

So vast yet autonomous a process as growth in the child cannot be solved by anatomical studies of form any more than by mass statistics of height and weight. Even embryology has failed, for we are still circumscribed by the myth that each stage in the development

* A paper read at the Medical Society of London on March 23rd.

of the human babe is a survival of an ancestral adult form. Psychologists and social anthropologists alike have abused Karl v. Baer's theory of biological recapitulation, and see in man a tiger red of claw, a barnyard cockerel, or a free swimming dog fish—stages which *Homo sapiens* has no time for.

It is unfortunate that the facilities afforded by a school medical service have been so largely devoted to that aspect of growth which has hitherto proved most unfruitful. Mass statistics of body-weight, height, sitting height, and cranial diameters have proved to be as barren as mere descriptive anatomy. The value of a piece of work is not commensurate with the number of measurements that it contains. In themselves the measurements may be as void of significance as mere anatomical descriptions. Significant figures and correlation factors may shed no light on causal morphogenesis, and may even have no significance in relation to the actual processes of growth.

The Growth Curve.

In a recent publication [1] I have summarised briefly the historical aspect of the problem of growth in the child, and analysed the typical growth curve in terms, on the one hand, of the three "springing-up" periods of babyhood, the second dentition, and puberty; on the other hand, of the three "filling out" periods, from 2 to 5, 8 to 12, and adolescence.

The type of growth registered by this curve is far from being an adequate representation of the profound changes taking place in any given child, and deals purely with changes in height and weight. Practically every external lineal dimension of the body, with the exception of the head and neck, fits into this type of growth. The skeleton as a whole, the length of the limbs, the growth of the thoracic cage and respiratory mechanism, and the muscle system as a whole present this general type of skeletal growth.

Scammon [2] has emphasised the departures from the general or skeletal type of growth. The brain, the eyeball, and the skull display a peculiar type of growth. From birth to 18 months these organs grow with extreme rapidity; by two years they have reached 60 per cent. of their adult size, and by 7 years of age almost adult size. This type of growth may be regarded as *neural*, and applies to the brain, spinal cord, eyeball, and skull, exclusive of the face.

The lymphoid tissue of the body, as illustrated by the lymphatic glands, tonsils, and thymus grows rapidly in childhood, and continues to grow at a somewhat slower rate to puberty. During adolescence and adult life there is both an absolute and a relative decrease in the amount of lymphoid tissue. In view of the extent to which lymphatic glands are involved in children at all ages, both as a result of acute disease and of chronic infections, this third *lymphoid* type of growth must be of deep significance.

The fourth type of growth is that presented by the *genital organs*. These organs grow but slowly in infancy, are almost stationary from 2 to 10, and grow rapidly in the two years before puberty, during puberty, and during adolescence.

Even these four types of growth, general or skeletal, nervous, lymphoid, and genital are but crude representations of the complexity of the processes involved. Dentition is not completed until about the twenty-first year with the cutting of the "wisdom" teeth. Growth in the face and neck continues to the same age. The suprarenal glands, the paired organs which lie in relation to the kidneys, lose one half of their weight in the first two weeks of postnatal life, remain stationary until the fifth year, and do not reach birth weight again until puberty. The uterus, which grows rapidly in the last month of antenatal life, loses weight in the first two weeks of postnatal life, and does not commence to grow appreciably until two or three years before the onset of menstruation.

The ductless glands, which have provided so many astounding experimental observations and so much feeble theorising, present a picture which defies analysis. The thyroid glands display steady growth from birth to maturity, with the tendency to enlargement in relation to puberty and pregnancy as a characteristic. The thymus follows the lymphoid type of growth. The pineal follows the nervous type, and the pituitary follows the thyroid. There is thus no trace of correlation in the growth pattern of the ductless glands.

It should be mentioned that the second springing-up period of growth, from 5 to 7 years, is not so clearly shown on some of the growth curves of height and weight as it is made manifest to the careful observer of the child. The cutting of the second dentition, often accompanied by nervous disturbances as significant as those of the first dentition, the marked lengthening of the face, the rapid development of the air sinuses in the face, and even the rapid lengthening of the foot in the sixth year, necessitating a larger size in footwear, the anxiety of the parents because the child is "going thin," the loss of subcutaneous fat—these are more evident to the careful observer than the statistics declare.

As soon as an attempt is made to analyse the growth processes it is seen that no scheme is adequate. The systems and organs have a changing pattern. The individual parts of any system, the various tissues of any organ, the constituent cells themselves, and the intracellular substance in turn present a most complex pattern of growth. Cell division, mitosis, chromosomes, genes—the concept is awe-inspiring. The tissues of the growing animal change in chemical composition from day to day. Each animal is a new biological experiment in growth.

PRECOCITY *v.* SLOWNESS OF GROWTH.

We have already noted the remarkable precocity of the nervous system in the child, a precocity whereby the brain and eye in particular reach almost adult size before the complete shedding of the milk dentition. This precocity is still more marked in the case of the organ of hearing and equilibration. In 1926 I showed a series of radiograms of the human fœtus in which it was seen that the tympanic membrane, internal ear, and semicircular canals became surrounded by bone during the nineteenth to the twenty-second week of fœtal life, in such manner that no further appreciable increase in size took place (Fig. 1). The rapid development of the muscular system in the fœtus, and the myelinisation of the vestibulospinal tract both occur at that time when the mother first becomes aware of the subjective symptom of quickening. At this time the tympanic membrane and internal ear have already reached adult size.

In contradistinction to this precocity of development of the internal ear, man is characterised essentially by a slowness of growth which is reflected in the long period of gestation, helplessness at birth, and postponement to a late date of puberty, sexual activity, and the completion of the second dentition by cutting of the wisdom tooth. No animal takes so long to grow as man, and this slowness of growth is associated with the high standard of his final attainments. If we examine the growth curve of any domestic animal, such as the dog, one is struck by the absence of springing-up and filling-out periods. The dog passes from puppyhood through the first

dentition, second dentition, and puberty within the space of 12 months. The curve of growth has not been broken up into alternating periods of slow and rapid growth, and the young animal scampers through its childhood.

There is much to be said for dismissing the catastrophic event called birth from its position as the starting-point in life. In all animal forms it is necessary to study the growth curve from the fertilisation of the ovum to adult life as one sequence. The rat is born blind, hairless, and helpless, after 22 days' gestation at a stage of skeletal development and ossification (Fig. 2) corresponding to that of a human embryo of the fourth month (Fig. 3). The guinea-pig is born in such an advanced stage that it is able to fend for itself. The skeletal development and ossification pattern (Fig. 4) is that of a 7-year-old child. Thus of two rodents, the one is born prematurely and spends a long period of childhood in postnatal development, the other is born postmaturely and has wasted its childhood in the amniotic sac, free from external stimuli, and is in a sense born too late to learn much from its delayed postnatal environment. The one acquires new behaviour patterns and is educable; the other is born so late that it acquires anew but few behaviour patterns, and is relatively uneducable. The rabbit and leveret, the bear and calf, the dog and pig, afford similar contrasts, as in the realm of birds do the silly goose and learned jackdaw. The pup and kitten are born in a stage of skeletal development and ossification corresponding to that of a human fœtus of the seventh month. If the pup grew slowly after birth instead of rushing through primary and secondary dentition to sexual maturity at one year it might look forward to a greater measure of educability and increased intellectual attainment.

The relationship of the pattern of skeletal development at birth to the growth of the brain has been considered elsewhere.[3] There is a remarkably close parallel between the two, and this is shown clearly in the radiogram of the new-born guinea-pig, which not only presents the ossification pattern of a child of 7 years, but also has a brain almost as large as an adult guinea-pig, in much the same way as the brain of the 7-year-old child is almost equal to that of an adult.

The actual stage of development and the degree of ossification in the new-born rat and guinea-pig explains why the maternal rat is depleted of blood calcium during lactation, but not during pregnancy; the maternal guinea-pig, with her "grown up" young in the womb, is robbed of calcium during pregnancy to a far greater extent than during lactation. Radiographic examination of the new-born is thus able to explain many of the apparent incongruities which appeared in the various reports of analyses of the blood calcium in pregnant and lactating animals.

Dramatic examples of alterations in the rate of developmental growth and in the time on the growth curve at which birth occurs are known to the breeder of animals. Thus the new-born bear weighs about 1 lb., although the mother may weigh up to half a ton.

FIG. 1. A B C

Three radiograms of the human fœtal skull indicating the rapidity of ossification in the tympanic ring and semi-circular canals after attainment of adult size. (A) 20 weeks; (B) 22 weeks; (C) 28 weeks.

In the case of the marsupials the young are born in an incredibly immature condition. For instance, Hartman [4] has shown that the American opossum has a gestation period of 13 days, of which the first seven and a half is devoted to carrying the fertilised ovum forward to the stage of the primitive streak, with commencement of formation of the notochord and medullary groove. In the next five and a half days the ovum grows miraculously from a minute flat disc to a viable embryo with precocious fore limbs and claws adapted for crawling into the pouch, but the hind limbs are mere paddles. Not until the young have grown from the birth weight of 0·13 g. to about 12 g. at the fiftieth day (about the size of a mouse) do the eyes open. At the other extreme of the mammals we have the bat, where the weight of the single fœtus may be as much as one-third of the maternal weight. The ossification pattern of the animal at birth, as aged on the human scale, is of significance not only to the anatomist but also to the pathologist. Thus the guinea-pig at birth is already too old to acquire perversions of growth such as rickets or those devastating gastro-intestinal and respiratory infections which take such a heavy toll of the young which are born in a helpless condition.

HORMONES.

The above examples indicate the complexity of growth from the mere morphological point of view with regard to the skeletal development and activity of the new-born. It cannot be too strongly stressed

that there is no philosopher's stone in biological research, and it is absurd to think that any one factor is responsible for so varied a pattern as we see not only from species to species but even from animal to animal within a species. The differences among themselves between domesticated breeds of cattle and pigeons are wider than those between related species in the wild. Of all the factors which have been studied in relation to growth the hormones have provided at one and the same time the most dramatic experimental results combined with the wildest theorising. In discussing the machinery of racial evolution, Sir Arthur Keith [5] says in relation to acromegaly: "In such cases we see a new physical type being produced under our eyes." That the anterior pituitary hormone is in no way responsible for the creation of new physical types is clearly indicated by innumerable experiments. The experimental work of H. M. Evans, Philip E. Smith, and others was largely performed by heterotopic transplants. The anterior pituitary of the ox transplanted into the immature female rat produces increased growth and premature ripening of the ovarian follicles. The pituitary of a senile dog of 14 years produces the same effect when transplanted into the female immature rat. Thus the action of anterior pituitary is qualitative rather than quantitative, and is common to the growing mammal rather than specific to a given class. Ox pituitary will grow "rat" as well as "ox," but it does not grow a new type of rat.

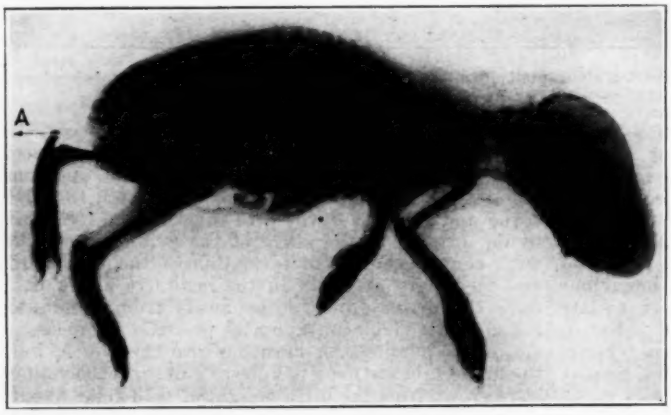
In a large series of embryonic pigs Smith and Dortzbach [6] have been able to find active anterior pituitary hormones, as tested by transplantation into immature rats, only in embryos of more than 10 cm. in length. The hormone producing increased skeletal growth appears at the 10 cm. stage, and the hormone producing increased growth of the ovarian follicles at the 17 cm. stage. Thus during the first half of the period of gestation the growth of the pig embryo does not depend upon its own pituitary hormone. Either the growth up to this stage is entirely independent of the anterior pituitary hormone, or the pig placenta is permeable in the earliest stages to the maternal pituitary hormone.

Schwind [7] has shown that the anterior lobe of the pituitary in embryonic rats is not recognisable as a

FIG. 2.

Radiograms of new-born rats. The degree of ossification in the rat at birth is comparable to that in a human fœtus of the fourth month.

FIG. 4.



Radiogram of a new-born guinea-pig. Note the secondary centre of ossification in the os calcis which appears in the human at 7 years. A = secondary epiphysis of the os calcis.

FIG. 3.

Radiogram of the human fœtus of the fourteenth week.

system of vascularised epithelioid cords until the fifteenth day of a gestation period of 22 days. It is clear, therefore, that growth in the embryo takes place in the absence of fœtal pituitary for 15 days. We do not know that the growth is due to permeation of the maternal pituitary hormone through the placenta. That the latter is possible is suggested by the evidence which is gradually accumulating in the reverse direction in favour of the protection of a diabetic mother by the insulin of the fœtus during the last three months of pregnancy. If placental permeation is possible, then the question arises as to whether the mother does protect her cretin in the uterus.

Two years ago Castle and Gregory,[8] studying the early stages of the developing ovum in large and small strain rabbits, suggested that the difference in size was fundamentally due to a difference in the rate of cell division. In the large strain of rabbits, the fertilised ovum has reached the 32-cell stage at 48 hours, whereas in the small strain of rabbits the fertilised ovum has only reached the 16-cell stage. This conception of increased rate of cell division as the determining factor in the size of the embryo denotes the possibility that size inheritance in rabbits is controlled by a mechanism independent of the endocrine glands. On the other hand, Gray has shown that more rapid rate of cell division in the developing eggs of trout, consequent upon increased temperature, leads to decreased size of the embryo on hatching. Newman has also shown that cross fertilisation of certain fishes leads to rapid rate of cell division in the embryo and diminutive size. Byerly,[9] working with eggs of the same size from a pure strain of Rhode Island Reds and White Leghorns, has shown that, notwithstanding the marked differences in size of the adult birds in this heavy and light strain, the differences in size during incubation are insignificant. Thus size inheritance in the bird is not due to differences in the rate of cell division.

VITAMINS.

A similar attempt to explain the complex processes of growth in terms of one or more pre-eminent factors is seen in the history of the vitamins. In turn fat-soluble vitamin A, fat-soluble vitamin D, and the water-soluble vitamin B have been regarded as "the growth-promoting vitamin." It is very unlikely that the complex processes of growth will be analysed in terms of any one vitamin or hormone. The broad biological conceptions which are emerging must be such as to account for those processes of growth which are common to the animal and vegetable world. In 1926 I put forward my views[10] on the rôle of the vitamins in relation to bone formation, and emphasised the need for clearly distinguishing between the processes of proliferation in cartilage, calcification in cartilage, and osteogenesis proper. Cartilage is a proliferative tissue with a matrix, devoid of blood-vessels, which is perfused by tissue juice for the nutrition of the cells. The proliferation of cartilage resembles that of bacteria, yeasts, vegetable cambium, and that of a gumma, tubercle, or an avascular tumour. Just as there is a limit to the size of a gumma or tubercle in man, so there is a limit to the size to which a colony of cartilage cells can grow. All growth of this type, mere proliferation, depends in particular both in the animal and vegetable world on a supply of water-soluble products, among which are the water-soluble vitamins such as vitamin B.

In the case of an epiphysial growth cartilage, the cells arrange themselves in columns, and when the limit of growth is reached by reason of the precarious mode of nutrition, the older cells become progressively senile, the matrix undergoes calcification, and the cells actually reach a stage of senescence bordering on death. This process of calcification in the matrix of a senescent colony of proliferative cells is seen not only in cartilage, but in proliferative tumours such as a gumma, tubercle, or fibroid. An analogous process in epithelial tumours leads to cell-nest formation and keratinisation. It is the same type of process which is seen in the conversion of a green stem into a woody stem in the ageing plant. This process of senescence in cartilage, accompanied by calcification of the matrix, occurs in the region of minimum nutritional potential, and is accelerated by vitamin D, ergosterol, or ultra-violet light. In the normal growing animal calcification of cartilage, and nothing but calcification, is controlled by vitamin D, sunshine, ultra-violet light or ergosterol. Thus the typical pattern seen in a normal epiphysial cartilage or costochondral junction is comparable to that seen in many forms of animal and plant life. It involves proliferation, senescence, and degeneration with calcification of the matrix.

The mass of aged calcified cartilage, whether in the shaft of a long bone in the embryo or in the epiphysis of the child, acts essentially as a foreign body and calls forth a mechanism which has much in common with aseptic inflammation. An eruption of blood-vessels occurs, and two highly vascular tissues, marrow and bone, replace the calcified cartilage. The process is comparable to that seen in the removal of any foreign body. The differentiation of pre-existing mesenchyme cells to form active osteoblasts or marrow cells depends on the supply of fat-soluble vitamin A. Vitamin A helps to replace an avascular proliferative tissue such as cartilage by a vascular tissue such as bone, fully differentiated for function at the expense of mere proliferation. If the supply of vitamin A is inadequate, the degree of differentiation of the osteoblast is limited, and ranges from that of an "osteoidoblast" to a minimum of differentiation in the fibroblast.

Rickets.

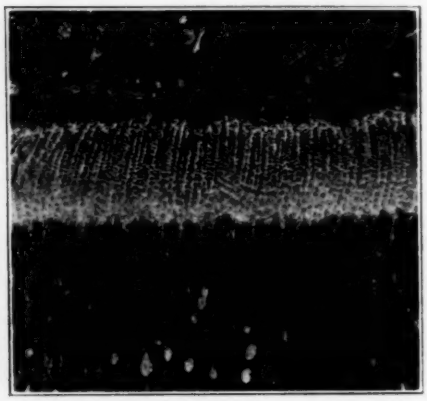
Rickets is a perversion of growth involving all three processes above described. The proliferation of cartilage is excessive, the calcification of the cartilage is defective, and the differentiation of true bone is imperfect. The three processes are in part dependent on water-soluble vitamin B, fat-soluble vitamin D, and fat-soluble vitamin A respectively. The avoidance of rickets calls for a balance in all three processes with a balanced supply of all three vitamins. The amounts of the vitamins necessary to guarantee normal growth depend to a considerable extent on the salt balance and degree of freshness of the food.

In the case of all animals it is necessary to know the range of variation in the appearance of the normal epiphysial cartilage. This can best be ascertained by counting the number of cells in the columns of proliferating cartilage, and counting the number of cells in the columns of calcified cartilage. The number of cells is virtually proportional to the rate of growth at a given epiphysis. It is maximal at the lower end of the femur, and minimal at the upper end of the radius and ulna. In order to indicate the method pursued in the study of growth a number of sections from the upper end of the tibia in rats will be described. The normal epiphysial cartilage (Fig. 5) shows cells in the cartilage zone, and cells in the zone of provisional calcification. Any increase or decrease in growth in the cartilage is immediately reflected in these zones, either in the positive or negative

direction. Arrested growth is shown by a decrease in the number of cells in the cartilage columns, and marked increase in the calcification of the longitudinal and transverse portions of the matrix. It is this zone of increased calcification which is later replaced by dense bone, and is eventually represented in the diaphysis as a line of arrested growth. Increased growth of the cartilage zone with deficient calcification is seen in the epiphysial cartilage of a young rat presenting severe rickets (Fig. 6). In this case the number of cells in the cartilage column is five times the normal, and there is over-proliferation of the cartilage combined with failure of calcification in the matrix between the older generations of cartilage cells. This indicates clearly that the first two factors in rickets consist of an overgrowth in the cartilage zone with a failure in the senescent process in the zone of calcified cartilage.

If such a rachitic animal be given vitamin D, either in the most efficient and economic form of cod-liver oil, or in the more expensive form of ergosterol or in the least efficient form of ultra-violet light, then the balance of cartilage and calcified cartilage is restored to normal, and the calcium is deposited there where calcification would normally have been deposited if the animal were not rachitic (Fig. 7). This zone of suddenly precipitated calcium is the line

FIG. 5.

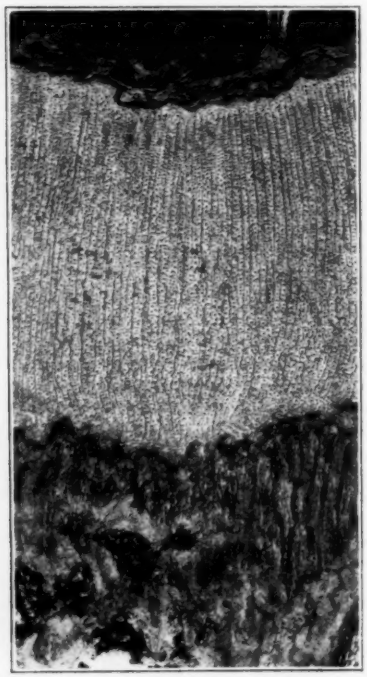


The growth cartilage at the upper end of the tibia in the rat to show the zone of cartilage, calcified cartilage, and bone.

FIG. 7.

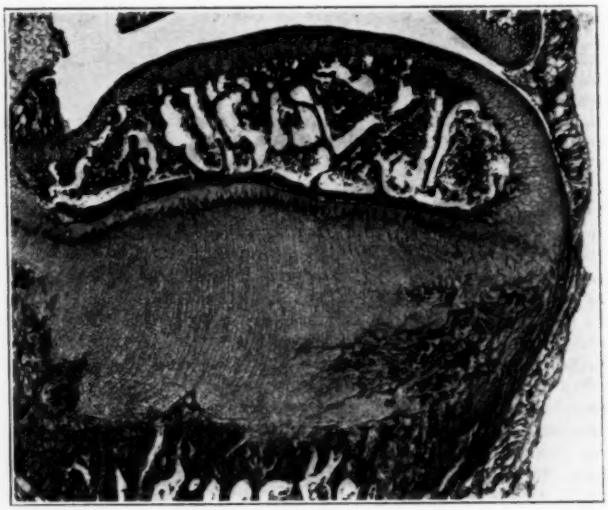
The growth cartilage at the upper end of the tibia in a rachitic rat. Healing of rickets induced by cod-liver oil. Note the heavy calcification in the rachitic cartilage which gives rise to the line of healing rickets on the radiogram (H.R.).

FIG. 6.



The growth cartilage at the upper end of the tibia in an extremely rachitic rat. Note the increased number of cells in the cartilage columns, defective calcification of cartilage, and osteoid tissue.

FIG. 8.



Rachitic rat submitted to a diet of water only. Note the irregular calcification in the redundant cartilage and the extension of bone formation from the diaphysis. There is no line of healing rickets.

of healing rickets which constitutes so valuable a test radiographically or histologically. The line of healing rickets is bounded by an epiphysial cartilage in which the cell count of the cartilage column has been reduced to normal. The line of *healing* rickets is not a line of *healed* rickets. The redundant cartilage has not only to be calcified but replaced by active bone and marrow. This process occurs only in the presence of an adequate supply of fat-soluble vitamin A. If the supply of vitamin D is inadequate the redundant cartilage is only calcified in part, many islands of cartilage cells escaping calcification and being carried into the shaft. The calcified cartilage is replaced by osteoid tissue or fibrous tissue or bone according to the amount of vitamin A available.

Thus vitamin D and vitamin A are not growth-promoting, but control calcification in cartilage and true osteogenesis respectively. If a rachitic animal be subjected to sudden prolonged starvation, without thirst, the changes occurring in the rachitic zone are quite distinct. Calcification occurs not at the locus of the line of healing rickets but in that portion of the redundant cartilage which adjoins the bony diaphysis. Such a rachitic rat, placed on a water diet (Fig. 8) shows scattered calcification in the cartilage and extension of bone formation from the shaft. The starving animal is quickly converted from a growing rachitic animal into a non-growing non-rachitic animal. If the starvation be continued the excess of cartilage is heavily calcified, and gives rise to a line of arrested growth bordering the zone of the true epiphysial cartilage.

As an example of the extent to which the previous history of an animal can be registered in so sensitive a structure as bone a microscopic section (Fig. 9) is presented of a rat which was reared on a normal diet and then submitted at intervals to two periods of starvation. The two lines of arrested growth due to the starvation are seen as two dense bony zones. This animal was then fed on a rachitic diet as shown by the extreme proliferation of the cartilage zone. The animal was then placed on a diet of water, and the self-healing of the rickets is shown by the extension of ossification into the rachitic cartilage.

The Nervous System.

I have selected one or two aspects of my own experimental and clinical work to illustrate the complexity of the growth processes. When we turn to the nervous system we find a type of growth which is peculiarly baffling. The relation of form to function is more than usually disturbed, and there is as yet no complete survey of the postnatal changes in structure and function of the various parts of the brain. It is no longer held so tenaciously that the number of neurones in the brain at birth is not increased in early childhood, any more than that the definitive number of ova of the adult are present in the ovary at birth. It is no longer certain that myelinisation of the fibre tracts indicates definitely the onset of function. The brain of the young rabbit has no area in the motor cortex, stimulation of which leads to movement in the hind limb. At this early age stimulation of the posterior corpus quadrigeminum in the mid-brain produces movement of the hind limb. In the opossum, as in the rabbit, this transference of control of the hind limb from the mid-brain to the cerebral cortex can be followed. Such examples of telencephalisation, whereby functions controlled in lower forms and by the young of higher forms are transferred from lower centres upwards to the cerebral cortex, are but a startling manifestation of the complexity of the growth pattern in the mammal. In the gradual transference of visual centres from the mid-brain to the occipital cortex, this process has been recently traced by Elliot-Smith.[11] The principle of persistence of fœtalisation, whereby the human embryo and child tends to maintain the fœtal pattern without departing widely therefrom in such widely different organs as the hand, foot, and face, has been discussed by Bolk [12] and Elliot-Smith.[13] This maintenance of simplicity, without too great a departure from the fœtal pattern, has guaranteed to man that power of adaptability to a new environment which is so important a factor in evolution.

FIG. 9.

The growth cartilage at the upper end of the tibia in a rat which presents two bony lines of arrested growth (A.G.), rickets and self-healing of rickets by starvation.

INDIRECT APPROACHES.

The problems of growth are being attacked from many other directions. Bagg [14] has succeeded in rearing a strain of mice from mothers submitted to the action of X rays. This strain presents a large percentage of deformities of the limbs, eyes, and kidneys. The deformities of the limbs have been traced to the earliest forms in the embryos. The earliest defect in the embryo is associated with the formation of a blister-like blob, which raises the epithelium in a localised area. The extent of the lesion appears to determine whether the resulting condition shall be polydactyly, syndactyly, hypodactyly or congenital amputation. Selective breeding in a series of over 5000 animals has greatly increased the number of foot defects in the offspring. This experiment appears to be a decisive proof of the experimental alteration of the germ-plasm by X rays. On the other hand, the recent experiments of Miss Durham [15] on the progeny of alcoholic guinea-pigs has failed to produce any confirmation of the dire results which Stockard claimed to have attained.

Loeb [16] and his co-workers have attacked the problem of growth in a quantitative manner by measuring the proliferative activity of the epidermis in various animals in terms of the actual microscopic

count of mitotic figures in the proliferating zone. The proliferative activity of the epithelium is lowered during the greater part of the sexual cycle and after castration, but increased during pregnancy. Malnutrition reduces the mitotic activity in the skin slowly but surely. Loeb has demonstrated clearly the complexity of the growth processes by proving that potassium iodide and thyroid gland which respectively depress and increase the activity of the cells of the thyroid acinus both have a depressant effect on the activity of the epidermis. Remarkable experiments on growth in vitro are being carried out in this country by Dr. Honor B. Fell and others at the Strangeways Laboratory. The views which I have expressed by surveying a limited portion of the field indicate the need for active liaison between workers in the different fields, if we are to prevent that jostling of medical science by quackery which Latham despaired of.

Acknowledgments.—I am indebted to Dr. Audrey Russell and Mr. F. Melville for invaluable assistance in the examination and radiography of animals; to Mr. A. K. Maxwell and Mr. F. J. Pittock for illustrations and microphotographs.

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SEPTICÆMIA TREATED WITH SCARLET FEVER ANTITOXIN.

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THE following cases of septicæmia occurring in children at the City Hospital, Little Bromwich, form an interesting group. Various cases have already been reported. One described by Hutinel[1] in 1911 followed scarlet fever and ended fatally. More recent cases have been reported by:—

(*a*) Roller,[2] whose case in an infant aged 16 months occurred after mastoidectomy and recovered as a result of treatment with polyvalent antistreptococcal serum, blood transfusions, and supporting measures such as saline injections, dextrose, and digitalis.

(*b*) Lord and Holmes,[3] whose case, a boy aged 14 years, also made a complete recovery after the administration of scarlet fever antitoxin.

(*c*) Rosher,[4] who has reported four cases of septicæmia, three in adults and one in a child—all recovering after treatment with scarlet fever antitoxin.

These last results are made the more striking by the fact that Roller[2] had collected 43 cases of general sepsis observed at the Children's Hospital, Los Angeles, of which ten were proved by blood culture to be due to a streptococcus and five more were found to be of streptococcal origin by blood cultures taken post mortem. Of these 43 patients, 40 died—a mortality of 93·1 per cent.—and of the 15 proved to be due to a streptococcus only the reported case which was treated with antistreptococcal serum recovered.

In each of the present series of seven cases, blood cultures were examined at the Birmingham City Laboratory. Six of these showed streptococci in the blood. In four of these no mention was made as to whether the streptococcus was hæmolytic; one was proved to be hæmolytic—this patient also having hæmolytic streptococci in the cerebro-spinal fluid—and one was stated to be non-hæmolytic. The seventh case gave a growth of *Staphylococcus albus* only on two occasions and, although all precautions were taken to avoid it, this was probably a skin contamination. All of these cases but one, which was mild in type compared with the others, received treatment with scarlet fever antitoxin with good results in five out of the six. Even in the case which ended fatally there appeared to be some response to serum, but this case was complicated by a streptococcal meningitis. Two of the cases (3 and 4) developed abscesses of the thigh at the site of injection of serum, and from both of these streptococci were recovered. These were in all probability in the nature of fixation abscesses. Two other cases (1 and 6) developed redness and localised swellings, one over the outer end of the clavicle and the other over the coccyx and great trochanter, which looked as though they would suppurate, but in both cases the swellings subsided without surgical interference.

Clinical Histories.

The following are brief résumés of the cases:—

CASE 1.—A male, aged 6 years, was admitted on July 28th, 1928, suffering from scarlet fever. The disease appeared mild at the onset and was not treated with serum. Towards the end of the fourth week he had albuminuria associated with increased pulse-rate and slight pyrexia. This was followed by a mild otitis media. Until this stage the child had not been desperately ill. On the forty-fourth day he became very much worse; the temperature rose to 104°; blood and albumin were both present in the urine; and general irritability, but no signs of meningitis were present. Blood taken for culture on this day showed streptococci (no mention was made of whether they were hæmolytic or otherwise), and 20 c.cm. of scarlet fever antitoxin were given intramuscularly on this day and repeated at three-day intervals—four doses, 70 c.cm. in all, being given. (The second dose was only 10 c.cm.) A typical septicæmic temperature was maintained for three weeks, the daily variations being 5° or more, during which time the albuminuria continued. During pyrexial periods the child became definitely worse, improving temporarily in the intervals. Only one rigor occurred. An intense serum œdema and rash occurred 12 days after the initial dose of serum. The tip of the spleen became palpable towards the end of the third week of pyrexia. At this time the daily remissions became smaller and by the end of another week the temperature was normal. As the temperature settled, a soft lump formed over the outer end of the right clavicle, but it soon subsided without suppuration. With the cessation of pyrexia, the albuminuria ceased and a marked general improvement took place. The patient was discharged quite well eight weeks after the onset of the septicæmia.

CASE 2.—A male, aged 3½ years, had been treated at home for scarlet fever and was admitted to hospital on July 27th, 1928, on the twenty-first day of the disease, when he was found to have a severe nephritis. Œdema of feet, legs, hands, sacrum, and face was present, together with an ascites and some œdema of the lungs and bronchitis. The urine contained blood and albumin. The heart sounds were soft, with an impure first sound at the apex and a systolic murmur at the base. The liver and spleen were palpable. Blood taken for culture the day after admission showed a copious growth of streptococci. The blood count showed a polymorphonuclear leucocytosis. The temperature, which was 101·4° on admission, remained up for two days, during which time his condition was unchanged. His temperature then fell and his nephritis became worse; packs were given

to induce sweating, as the secretion of urine was only 11 oz. in 24 hours. After two days his temperature rose again, though the nephritis was now improving. At this stage 20 c.cm. of scarlet fever antitoxin were given intramuscularly. A systolic murmur had developed at the apex of the heart and the child was very ill. After four days of pyrexia, which varied between 100° and 102°, the temperature gradually fell to normal in three more days, after which a slow but gradual improvement continued. All œdema had subsided by the time the temperature reached normal. A week later the spleen was no longer palpable and the heart sounds had improved in quality. Four weeks later the blood culture showed no streptococci. The nephritis did not completely clear up for several weeks, but no other complications occurred except an alveolar abscess, which subsided after the removal of a tooth. The patient was discharged quite well four months after admission.

CASE 3.—A female, aged 2½ years, was admitted on Jan. 2nd, 1928, suffering from faucial diphtheria, from which she made a good recovery. During convalescence she developed typical scarlet fever which was treated with 10 c.cm. of scarlet fever antitoxin, intramuscularly, on the third day. Pyrexia up to 101° continued for two weeks, after which it settled. During the last few days of pyrexia she developed a double ear discharge, but there was no evidence of any acute mastoiditis. Three weeks later—i.e., five weeks after the onset of the scarlet fever—she had a second attack of scarlet fever with rash and peeling tongue; the temperature rose to 102·4° and thereafter the condition became one of septicæmia. Swinging pyrexia and rapid pulse were present, associated with a palpable spleen. Blood culture showed the presence of streptococci. On the ninth day she was desensitised and 20 c.cm. of scarlet fever antitoxin were given intramuscularly. Three days later a further 20 c.cm. were given (10 c.cm. intravenously and 10 c.cm. intramuscularly), followed by a further 10 c.cm. intramuscularly two days afterwards. The excursions in the temperature chart began to lessen after the first injection and the temperature became normal and remained so three days after the third injection. The ear discharge, which had continued since the first attack of scarlet fever, ceased after the second injection. With the cessation of pyrexia, her general condition improved but her convalescence was interrupted by the formation of a large abscess in the thigh at the site of the injection. This was opened and drained and streptococci were cultured from the pus. The wound healed well and her recovery was complete.

CASE 4.—A male, aged 2½ years, had a vague history of sore-throat and vomiting for three weeks previously, accompanied by rigors. He was then thought to have diphtheria, and antidiphtheritic serum was given into the anterior abdominal wall and he was admitted to hospital on Nov. 12th, 1929. On admission he was found to have slight pyrexia (99°) but no definite physical signs, and no membrane was present on the fauces. Thenceforward he had swinging pyrexia varying from 98·4° to 103°. The right side of the abdomen was tender, owing to the injection of antidiphtheritic serum given before admission, but there was no evidence of local infection of the abdominal wall. A firm superficial swelling, increasing in size, formed over the posterior end of the right iliac crest and to the right of the vertebræ, but there was no evidence of involvement of the hip-joint or spine. X ray examination showed no abnormality. He was drowsy, but when roused became irritable. A blood culture taken ten days after admission gave a copious growth of a non-hæmolytic streptococcus. Lumbar puncture revealed a clear sterile fluid under pressure.

Thirteen days after admission, during the whole of which time he had had swinging pyrexia, 30 c.cm. of scarlet fever antitoxin were given intramuscularly and a further dose of 20 c.cm. in 48 hours. A marked improvement followed; the temperature no longer showed a remittent character and became normal in 48 hours, remaining so except for rises, of 12 hours' duration only, two and 11 days later, associated with the formation of abscesses over the right sacro-iliac joint and in the thigh at the site of the serum injection. These were opened and drained and healed well. With the fall in temperature following the serum injections there was a general improvement in the child's condition. He was less irritable and started to take nourishment better. From then on he made good progress. Blood taken three weeks after the injection of serum was sterile. He was discharged well after a total stay in hospital of nine weeks.

CASE 5.—A female, aged 10 years, was admitted to hospital on Jan. 3rd, 1930, the twenty-third day after the onset of scarlet fever, for which she had been nursed at home. During the few days preceding admission she was said to have had pyrexia, pains in the head, and some delirium.

On admission she was bright and not complaining of any pain or discomfort; the temperature was 101°; she had a dry, coated tongue; the urine was scanty and contained a trace of albumin; and the bowels had not been opened for two days. The heart condition was satisfactory. There was discharge from the left ear with reddening of the postero-inferior quadrant of the drum and a small perforation, but no swelling or tenderness over the mastoid process. Five days later she showed meningeal signs and symptoms. She was restless and irritable with short periods of drowsiness; neck rigidity and Kernig's sign were present, and the pupils were dilated, but there was no squint. There was practically no ear discharge, but tenderness developed over the tip of the left mastoid, though no œdema was present. Lumbar puncture showed slightly turbid fluid under increased pressure, and streptococci were obtained on culture. The blood also contained hæmolytic streptococci. The patient was seen by Mr. Scott Mason—one of the visiting surgeons attached to the hospital—who decided to open the left mastoid. When exposed the cells were found to contain greenish pus and a small extradural abscess was present.

Owing to the extensive infection on the left side, accompanied by such paucity of symptoms, the right mastoid cells were opened and found to be similarly involved, but to a lesser extent, though there had been no symptoms or signs on that side at all. The wounds were left open to promote drainage. Scarlet fever antitoxin was given—30 c.cm. intramuscularly and 30 c.cm. intravenously. The next day the neck rigidity and Kernig's sign were unchanged; mentally the patient was bright but inclined to be peevish; the temperature remained up. By the next day she was very irritable, resisting all attempts to examine and feed her. A further 30 c.cm. of scarlet fever antitoxin were given intramuscularly; lumbar puncture was repeated and 30 c.cm. of greenish fluid under pressure was withdrawn, which gave her relief. By the next day she was unconscious and lying on her left side; rigidity of the limbs was more marked. Lumbar puncture was repeated daily. After 48 hours complete unconsciousness the coma was found to be less deep; she took 6 oz. of milk by mouth and responded when touched. A further 30 c.cm. of scarlet fever antitoxin were given intramuscularly. Each day during the next week the coma and rigidity became a little less marked. By the end of three days she appeared to be aware of the presence of people and could carry out simple orders, such as putting out her tongue, and by the end of the week could answer questions a little. Throughout this time lumbar punctures were repeated and further quantities of serum given: 60 c.cm. intramuscularly, 15 c.cm. intrathecally, and 15 c.cm. intravenously, amounting in all to 210 c.cm. from the commencement of serum treatment.

She remained at this stage for four days, but the improvement was only temporary. She became more drowsy although still taking food by mouth; the rigidity again increased; there was an extensor plantar response on the left side; the knee-jerks were present and the abdominal reflexes absent. She lay persistently on her left side, resenting movement and tending to vomit when turned. The next day she was more comatose. Lumbar puncture revealed a straw-coloured fluid—not under much pressure. Wasting became extreme and she stopped taking food by mouth, nasal feeding alone being used. Each day after this she became progressively worse, and she died 26 days after the onset of coma, during which time she regained partial consciousness for one week after six days' complete coma.

Post-mortem examination showed increased intracranial pressure, much bulging occurring when the vertex of the skull was removed. The base of the brain was covered with inspissated pus, especially round the medulla. The lateral ventricles were very dilated, little cerebral tissue remaining round them. When opened, large quantities of green pus flowed out.

Although the patient died from streptococcal septicæmia and meningitis, the case is remarkable in that she lived 29 days after streptococci had been recovered from the cerebro-spinal fluid. There appears to be little doubt that the scarlet fever antitoxin was an important factor in prolonging life, especially considering that definite clinical improvement followed some of these injections.

CASE 6.—A female, aged 13 years, was admitted on March 8th, 1930, suffering from a moderately sharp attack of scarlet fever which was treated with 20 c.cm. of scarlet fever antitoxin. The rash faded, but the temperature did not fall to normal as usual. Three days later an acute right otitis media with perforation of the drum and free otorrhœa occurred, accompanied by swinging pyrexia and rather intense frontal headache. The temperature became normal after 12 days' remittent pyrexia, remained normal for a week, and then rose again to 103° with morning remissions to 101°. Albuminuria occurred at this time. After four

more days the temperature was again normal, but remained down for four days only, rising again to 105°. No complaints except that of frontal headache were made. The right otorrhoea continued, but there was no evidence of any extension to the mastoid cells or of any meningeal infection. The chest showed no abnormality. The heart sounds were pure and well heard, and the heart's action rapid but regular. The next morning a rigor occurred; 20 c.cm. of scarlet fever antitoxin were given intramuscularly and blood was taken for culture. For the next three days a typical septicæmic temperature occurred: morning temperatures were subnormal and evening temperatures were between 100° and 104°. A rigor occurred on each day. Further intramuscular injections of 20 c.cm. of scarlet fever antitoxin were given on the second, third, and fifth days following; in all 80 c.cm. were injected in addition to the dose on admission. During the pyrexial period vague pains were felt in the hips and knees. An area of reddening occurred over the coccyx, and pain and tenderness were present over the left great trochanter. The first heart sound had become muffled. The blood culture gave a growth of *Staphylococcus albus* only, which may or may not have been causal but was probably a contaminant.

Two days after the last injections of scarlet fever antitoxin the temperature no longer showed a typical septicæmic course, but varied between 98° and 100° and became normal in the course of ten days, only one small rigor occurring during that time. The pains in the limbs were no longer present, and no pus formation occurred at any of the reddened or tender points. Definite improvement and convalescence followed. This was interrupted by a mastoid operation for the persistent otorrhœa, which later showed signs of extension to the mastoid cells. From this she made a good recovery, and she was discharged well, with the wound healed four months after admission.

For four weeks after admission the girl's condition was unsatisfactory, and in the fifth week it became much worse with the onset of rigors. The administration then of large doses of scarlet fever antitoxin, all intramuscularly, proved of great value and the condition improved from that time.

CASE 7.—A male, aged 2½ years, was admitted on May 31st, 1930, the fifth day of illness, with a history of sore-throat, vomiting, and rash. On admission no rash was seen; the throat was slightly injected; the heart sounds were normal but tachycardia was present (pulse-rate 130 per min.) and the temperature was 99·8°. By the next evening the temperature had risen to 100·4° and the pulse-rate to 140 per minute. A typical stripped papillated tongue was now in evidence. A little bronchitis was present. The child complained of abdominal pain, and there was some abdominal distension but no tenderness or rigidity. The temperature remained between 101° and 103° for a further 48 hours and blood was taken for culture and for a Widal reaction. The next day the temperature was down to 99·4° and by the next evening it was normal. The Widal reaction was reported to be negative, but streptococci were grown from the blood culture. As, however, the temperature had reached normal by the time the laboratory report was received, it was decided to withhold serum for the time being. The temperature remained normal and the child made an uninterrupted recovery, no serum being given. Throughout this child was never so ill as any of the other children, constitutional symptoms being very slight.

These cases are presented as additions to the material already available on this subject. From the clinical standpoint it appears to be clear that in any case in which there is reason to believe that the septicæmic condition may be streptococcal, the repeated administration of scarlet fever antitoxin is well worth consideration. It may be that the action is entirely specific, but it is more than probable that non-specific protein therapy also plays its part.

The serum used for the treatment of these cases was Burroughs, Wellcome and Co.'s concentrated scarlet fever antitoxin, except in Case 5, where both Burroughs, Wellcome and Parke Davis and Co.'s scarlet fever (streptococcus) antitoxin were used.

I am indebted to Dr. E. H. R. Harries, medical superintendent of the Birmingham City Infectious Diseases Hospitals, for permission to publish these cases.

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CLINICAL AND LABORATORY NOTES

PARADOXICAL EMBOLISM OF THE BASILAR ARTERY.

BY STANLEY J. HARTFALL, M.B., B.SC. LEEDS, M.R.C.P. LOND.,

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IN the following case two rare and interesting events were associated. The first, paradoxical embolism, was recognised by Cohnheim and has recently been the subject of special interest and study. The second, even rarer, is embolism of the basilar artery.

Dahl Iversen [1] has recently published a case of paradoxical embolism affecting a peripheral artery, the left external iliac. It was associated with phlebitis and venous thrombosis in the opposite (right) leg. Embolectomy was performed and a typical thrombus, 12 cm. long, which had doubtless passed through a patent foramen ovale, was removed. The patient made a complete recovery. Thompson and Evans [2] have presented five new cases of paradoxical embolism and give a statistical investigation of the frequency of patency of the foramen ovale in 1100 consecutive post-mortems. They have collected and analysed 24 cases of pulmonary embolism where this congenital defect was present. They also offer certain arguments upon the possibility of alteration of the normal relative blood pressures in the auricles following pulmonary embolism. Beattie,[3] who reported two cases of paradoxical embolism, first suggested (in 1925) that sudden obstruction in the pulmonary circulation, by raising the pressure in the right and lowering it in the left auricle, might influence the direction of blood-flow through a patent foramen ovale. The experimental work of Haggart and Walker [4] suggested this, for they had shown in cats that a rapid rise in the pulmonary blood pressure followed sudden occlusion of the left pulmonary artery. Barnard [5] reports a case occurring as a post-operative complication, with clot lodged in the foramen ovale, and also refers to obstruction in the main pulmonary arteries.

Embolism of the basilar artery is an extremely rare condition and no example of it has been found in recent papers. Cases have been reported, however, by Chadwick,[6] of Leeds, in 1886, and by Maudsley [7] in 1887. There are good anatomical reasons why it should be uncommon. The basilar artery has a wider lumen than either of its constituent vertebral arteries; hence an embolus which passes through a vertebral artery is unlikely to be held up in the basilar. Further, the artery is straight and of uniform calibre, having no sudden constriction, and its branches are given off more or less at right angles.[8]

CLINICAL HISTORY.

The patient, a healthy male aged 49, sustained a compound fracture of the right tibia and fibula with a severe lacerated wound of the leg. He was admitted to the Leeds General

Infirmary under the care of Mr. S. W. Daw and an amputation through the upper third of the right leg was performed, leaving a long anterior flap.

The patient apparently made satisfactory progress, although for some days the condition of the wound and flaps gave rise to anxiety. However, the local condition eventually settled down. Thirty-two days after operation I was asked to see the patient urgently. At 6.20 A.M. he had appeared to be in his usual state of health; a few minutes later he had complained of numbness in the left foot and tightness in the chest, and before further information could be elicited had lapsed suddenly into unconsciousness. When seen at 6.35 A.M. the patient was deeply comatose and could not be roused; the breathing was noisy, but soon assumed the Cheyne-Stokes character. The wound of the leg appeared healthy. The pulse-rate was 84 and the pulse of small volume; the respiration-rate was 30 and the temperature 99°. There were slight convulsive phenomena of general distribution with a tendency to very slight opisthotonos. Already there had developed general spasticity with increased tendon reflexes, clonus, and bilateral extensor plantar response. The eyes showed occasional and quite irregular jerking deviation to the right; the left pupil was small and non-reacting, the right large, dilated, and fixed. Examination of the heart revealed nothing abnormal; there was no irregularity or evidence of valvular lesion. A later examination of the chest, however, revealed certain indefinite signs near the middle of the right lower lobe in the posterior axillary line. Here, over an area of about two inches in diameter, despite the noisy breathing, distant bronchial breathing could be made out with slight impairment of the percussion note. With deepening coma, rising pulse, Cheyne-Stokes respiration, and a temperature reaching 103°, death occurred eight hours from the onset.

The diagnosis of paradoxical cerebral embolism was made upon the following grounds: the sudden cerebral catastrophe, the absence of signs of a cardiac valvular lesion, the presence of signs in the chest compatible with infarction of the lungs, and finally the existence of a wound which, although now clean, had a past history of sepsis and therefore introduced the possibility of venous thrombosis. The situation of the embolus was extremely doubtful and the diagnosis of an obstruction to the basilar artery was not formally made. It was, however, discussed by reason of the anomalous features of the paralysis. The rapid development of bilateral spasticity and exalted reflexes was considered distinctly unusual. The other points of possible importance were the jerking eye movements to the right and the tendency to hyperextension of the spine.

POST-MORTEM FINDINGS.

Autopsy was performed by Prof. M. J. Stewart, to whom I am indebted for the following notes (only relevant matter is included).

Brain, membranes, and vessels.—There is no evidence of basal meningitis. The vessels at the base of the brain show only very early atheroma. On close inspection a piece of thrombus fully 1 cm. in length is found in the basilar artery close up to the anterior bifurcation. The greater part is recent soft blood-clot, more or less filling the lumen of the vessel, but the anterior extremity is pale, friable, and non-adherent. It is only about 2 mm. in diameter.

Lungs and pulmonary arteries.—The larger branches of both pulmonary arteries and some of the smaller contain a number of detached portions of pale, soft, rather friable thrombus, very similar except for their larger size to the embolus at the bifurcation of the basilar artery. They are more abundant in the right pulmonary vessels than in the left.

Lungs.—On the postero-lateral aspect of the right lower lobe there is an extensive anthracotic and partially fibrotic area over which lies a considerable subpleural patch of adipose tissue. There is well-marked œdema elsewhere but no evidence of infarction.

Heart.—There is a widely patent, partially valvular foramen ovale. Its antero-inferior margin is curved and smooth and overlaps the posterior on the left auricular side. The postero-superior margin is thinner and overlaps on the right auricular side. Its margin is continued across by three fine fibrous strands, except for which a finger could easily be passed through the foramen. The overlapping of the flaps is incomplete, and without undue strain being put upon them there is an orifice with a diameter of 1 cm. from above downwards and 0·5 cm. across. The mitral and aortic cusps show patchy atheromatous degeneration, and similar changes affect the coronary arteries. The aorta shows very slight atheroma.

Post-mortem anatomical diagnosis.—Amputation of right leg for compound fracture; embolism of pulmonary arteries; large patent foramen ovale with paradoxical embolism of basilar artery.

COMMENTARY.

The chief features of interest in this case are: (1) the association of a somewhat unusual source of intravenous emboli with a widely patent foramen ovale; (2) the ante-mortem difficulty in determining which particular cerebral vessel had been occluded; and (3) the possible part played by the pulmonary embolism in determining the passage of a piece of thrombus from the right auricle to the left. On clinical grounds it appears improbable that the pulmonary embolism preceded the cerebral by any appreciable interval of time, though possibly they can be regarded as simultaneous phenomena.

In view of the large size of the aperture in the auricular septum and the absence of definite post-mortem signs of infarction in the lungs, it is perhaps more reasonable in this case to assume that a small particle of detached thrombus passed directly through the foramen, and that no important part was played by the pulmonary obstruction, which, indeed, may have been a later happening. In this case it is doubtful whether anything like one-third of the pulmonary circulation was obstructed, which, according to Thompson and Evans, is the minimum necessary to disturb the normal pressure balance between the auricles and thus favour the projection of a stream of blood from the right to the left. Granting, however, that there may have been some such disturbance and that the pulmonary obstruction was first, if only by a few seconds, then the fine fibrous strands across the foramen could offer obstruction only to a large mass of detached thrombus. There could be no serious interference with the passage of the small embolus which in the present case obstructed the basilar artery.

I am indebted to Mr. Daw for permission to publish this case.

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ADMINISTRATION OF OXYGEN IN PRIVATE PRACTICE.

BY W. E. WALLER, M.D. OXF., M.R.C.P. LOND.

WHEN the administration of oxygen is necessary in private practice and a cylinder and "fittings" are procured, the latter are often found to consist only of a length of tubing and a glass funnel. The amount of the gas used has therefore to be calculated either from the sound as the gas is emitted or from the rate of the flow of bubbles when the distal end of the tube is held under water, the proximal end being attached to the nozzle of the cylinder. The former method is wasteful, the latter inconvenient. In country practice complicated apparatus is not usually available at short notice, and the following improvisations, which I have employed for many years, will be found to work well.

A gauge for measuring the flow of gas can easily

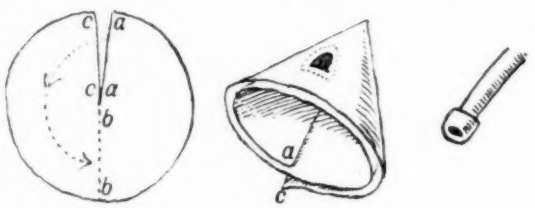
be made as follows. A suitable bottle of one pint capacity is fitted with the cork supplied with Potain's aspirator. The rubber tubing supplied as "fittings" is cut into a short and a long portion; the former is connected to the nozzle of the cylinder and to the inlet pipe of the aspiration cork, the latter to the outlet pipe and the mask, the bottle being half filled with warm water or any selected fluid. The fitted bottle is slung and secured safely to the side of the cylinder by appropriate bandages. The flow of oxygen is easily controlled by this method, a rate of 8–12 bubbles per second being sufficient in most cases.

It may here be noted that, in most cylinders, if the tap is turned to such an extent that the hiss of gas is only just perceptible, the rate of emission is such that the cork of the gauge described above would be blown off instantly. It may also be noted that special oxygen bottles, fitted with cork and inlet and outlet tubes can be obtained at a cost of about five shillings.

If the above method is impossible, a large basin of warm water is arranged on a table close to the bedside, the tube is attached to the cylinder and its distal end is held under the water, the rate of flow of the bubbles being noted. When using this method, as much of the tubing as possible is kept below the surface of the water, in order to warm the gas slightly. This method, though often used, is inconvenient; the gas is not moistened, the mask has to be detached for testing, and accidents with the basin may occur.

A glass funnel used as a mask is both wasteful and inefficient, but a much more efficient mask can be improvised in about one minute as follows. A circle of ten inches diameter is cut from two or three layers of newspaper and a single radial cut made throughall layers from circumference to centre (Fig. 1). A cone is then formed by rotating the edge *a a* to the line *b b* to form the inside, the edge *c c* being then rotated in the opposite direction to form the outside. The two free edges *a a* and *c c* should both be on the line *b b* when the cone is complete, and may be secured by pins or stitches (Fig. 2). The apex of the cone is then cut off to an extent just sufficient to allow of the passage of the tube, the end of which is "flanged" to secure it in position (Fig. 3). If some kind of expiratory valve is considered necessary, a small D-shaped opening is cut through all the layers (Fig. 2) and covered by a thin flap of tissue paper sufficiently

FIG. 1. FIG. 2. FIG. 3.



Improvised mask for administration of oxygen.

large to overlap the edges. This flap is gummed in position on the outside of the mask by its straight limb only. The edges of the mask can be fashioned so that the fitting to the patient's face is reasonably accurate.

Two special precautions in the administration of oxygen in private practice may be mentioned:—

1. The apparatus should be tested in a place other than the sick room, so that the attendants, by practice, can learn to avoid any startling noises, cork-blowing, or other phenomena which might alarm a nervous patient.

2. The patient should be placed in a position of complete ease and relaxation, as far as his condition allows. It is of importance that the mask should be held in position by the attendant for the whole of the prescribed time. On no account should the patient be allowed to undergo the exertion of supporting the mask himself.

Rustington, Sussex.

MEDICAL SOCIETIES

ROYAL SOCIETY OF MEDICINE.

SECTION OF MEDICINE.

AT a meeting of this Section held on March 24th the chair was taken by the President, Dr. R. A. YOUNG, and a discussion on the

Value of Liver in Treatment

was opened by Dr. JANET VAUGHAN. The anæmias she said, could be classed according to their response to liver. Those responsive to liver and stomach extracts included idiopathic pernicious anæmia, sprue, the pernicious anæmia of pregnancy, and pernicious anæmia associated with intestinal lesions. This group was characterised by a deficiency in the gastric digestion of protein and a megaloblastic hyperplasia of the bone-marrow. Clinically and experimentally it seemed likely that the effective principle in liver and stomach extracts was essential to the normal development of megaloblasts and that it was elaborated by the gastric digestion of protein. The liver and kidneys were probably only storage depôts. When faulty gastric function prevented the development of this principle the megaloblast was unable to develop and therefore proliferated.

The second group, consisting only of secondary anæmia after hæmorrhage, was responsive to whole liver and not to extracts.

The third group was responsive to whole liver, and also to iron. It included secondary anæmias associated with starvation, cancer, hæmorrhage, and deficient dietary in children. In the second and third groups there was no defect of protein digestion, but there was often achlorhydria. Megaloblastic hyperplasia did not, therefore, occur, and extracts, which only contained the principle affecting megaloblastic tissue were useless. The deficiency was perhaps due to faulty absorption of both iron and the second factor present in whole liver, the failure depending on achlorhydria. Iron was more readily absorbed, in small doses, from an acid than from an alkaline medium.

A fourth and fifth group were constituted respectively by anæmias and blood diseases, irresponsive to liver: simple achlorhydric and aplastic anæmia and secondary anæmias associated with leukæmia, sepsis, nephritis, Banti's syndrome, acholuric jaundice, cirrhosis, and scurvy; and hæmophilia and purpura hæmorrhagica. Some observers had claimed that these two blood diseases responded to liver, but Dr. Vaughan's experience had not confirmed this claim.

She described work on grain-fed pigeons, showing

the effect of liver feeding on the marrow and blood cells. The reticulocytes in pigeons were increased in number and altered in character by effective doses of liver. The reticulum was more densely stained and the nucleus much more immature. The results had been obtained whether the liver was given by mouth or intravenously, except when sepsis was present, but no response had been given by clinically inactive extracts or control substances, with the exception of beef-steak.

Intravenous administration was ideal in acute cases, but not always possible, and the best substitute was massive oral feeding. The need was to give as much as possible in the shortest possible time. If the patient could not swallow heroic doses such as 3000 g. the liver must be given by stomach-tube or per rectum with saline or glucose. It was possible to calculate to within 1 per cent. the level to which the reticulocytes would rise in a patient. There was an accompanying increase in the serum uric acid, a fall in the serum pigment, and disappearance of iron from the tissues. The red-cell count must be kept above 4 million. Extracts were very much more effective than whole liver.

The factors in liver affecting blood production were as specific in their action as vitamins or endocrines. Minot had shown that the anæmia of scurvy was influenced by orange-juice, although liver and iron were ineffective. Liver was only of value in anæmia when it could supply some already existing deficiency. A greater quantity of liver was required to affect a cord lesion than to alter the blood picture; there had been a failure in the past to appreciate the need for adequate doses.

Certain factors could affect the absorption of liver: sepsis, nervous lesions, arterio-sclerosis, and iron and thyroid deficiencies. If they were present the dose must be doubled or trebled. A mild sepsis might account for inability to keep the blood count up, and should be found and treated. Old people often needed a higher maintenance dose than younger ones. Thickened vessels might cause some failure of absorption of essential substances, as other deficiency diseases were apt to occur in arterio-sclerotics. Iron deficiency might occasionally affect acute cases, but was very often a definite factor in maintenance-dose cases. A certain small group of cases with lowered basal metabolic rate did not respond properly unless thyroid were given as well as liver. Liver therapy could only receive justice if these factors were realised and the necessity of an adequate dose was grasped. An "adequate" dose was usually one that appeared to be absurdly large.

DIAGNOSTIC CRITERIA OF PERNICIOUS ANÆMIA.

Dr. S. C. DYKE said that there were many mistaken diagnoses of pernicious anæmia, both negative and positive. It was essential to find evidence of an average increase in the size of the red cells, achlorhydria and hæmolysis. The colour and volume indices were usually above unity, though in a few rare cases the former might be low. A modification of the Pijper method by which a film of the blood was used as a diffraction grating should never be omitted in these cases. Hæmolysis was shown by skin colour and urine examination, and especially by the van den Bergh test; and achlorhydria by the test-meal, which should be repeated after the administration of histamine. A few cases of obvious pernicious anæmia had shown free hydrochloric acid. Free acid was essential for the development of the anti-anæmic principle, but anæmia might apparently develop even in its presence. The response to liver formed a final diagnostic test. To determine whether or not any case would respond to liver need not take long; the reticulocyte crisis occurred about the fifth day. If it was not seen by then, the case was probably not one of pernicious anæmia. A very good idea of whether or not a reticulocyte shower was taking place could be obtained by making an ordinary blood-film on a slide smeared with brilliant cresyl-blue. There was a characteristic platelet deficiency, and retinal hæmorrhage had been seen, though ordinary purpuric manifestations did not occur. The liver treatment caused a platelet crisis rather later than the reticulocyte crisis, but the platelet count did not always fall again.

When a patient took whole liver well it could be given on alternate days with the extract, but the results were the same whatever the form in which liver was given. Commercial extracts varied considerably in potency. For weak patients half a pound of liver a day might be a severe ordeal, and extracts of proved potency were of great value. Blood transfusion was becoming less and less often needed; it could be used too freely. The gastric symptoms often took patients to surgical wards, but were soon relieved by hydrochloric acid. Bouts of nausea and anorexia should be regarded as remissions; the dose should be increased, not reduced, and hydrochloric acid should be given and perhaps the make of extract changed. There was no value in iron and arsenic tonics or "stuffing." The nervous manifestations were often the most distressing feature; they usually improved rapidly on liver if there were no pareses or definite lesions. Severe lesions slowly and steadily improved after the red cell count had passed four million for some time. There was a tendency for everybody to be satisfied with the patient's condition when the count was about 3½ million, but in these cases nervous manifestations might occur or relapse. The blood count must be carefully watched, as relapses might be very insidious.

The grave anæmia of pregnancy was fairly well defined and might respond to liver. It responded admirably to blood transfusion alone. Secondary anæmia from hæmorrhage responded to liver in puerperal gastric and hæmorrhoid cases, and in cases of ulcerative colitis and metrorrhagia. The effect was enhanced by iron. Liver was unsuitable for early cases of gastric ulcer, as it caused acid secretion in the stomach; moreover, it caused the fæces to give the reaction for occult blood and so might confuse diagnosis. Liver and iron had no effect on the bowel lesion, but were useful for the anæmia of ulcerative colitis. Liver was useless for chlorosis.

EFFECTS OF STOMACH EXTRACTS.

Dr. J. F. WILKINSON said it seemed possible that the gastric mucosa might be a very potent source of the substance lacking in pernicious anæmia. The stomachs of the ox and sheep had not proved to have therapeutic value, but the raw stomach of the pig had given excellent results. One patient was keeping well on 2 lb. of raw stomach per month, eaten during the three days after his monthly visit to hospital. This was the cheapest and most palatable method known. Desiccated extract also acted satisfactorily, and the initial dose, even in severe cases, need not exceed one or one and a half ounces. The average maintenance dose was between one-third and three-quarters of an ounce. It was essential to use an active preparation. The results in pernicious anæmia and the pernicious anæmia of pregnancy were very similar to those obtained with liver, but

rather more rapid. Of 114 cases, 108 had been on this treatment for over six months; 31 had relapsed on liver treatment. All had done well and none had needed hydrochloric acid and pepsin for gastric trouble. Six per cent. still had some degree of nervous impairment, and 92 per cent. were free from symptoms, although more than half had complained of paræsthesiæ before treatment. Three of eight cases with definite postero-lateral involvement of the cord were now on full work, and four were greatly improved. In no case had a missing reflex returned. Blood counts were over 5 million in 85 cases, and over 4 million in 22 cases. Some were over 6 million. It was essential that the treatment should be continued and that regular blood examinations should be made. The slighest infection, even the common cold, profoundly influenced the red cell count, and the dose should be temporarily increased. The active substance in liver and in stomach was not the same.

Aplastic anæmias and acute leukæmias did not respond to pig's stomach, but some improvement had been seen in cases of gastric operation for hæmorrhage. One case of cancer of the mouth associated with a pernicious anæmia blood picture had done remarkably well; in another the blood picture had changed to that of secondary anæmia. The gastro-intestinal symptoms of simple achlorhydric anæmia were well relieved, but the blood condition was not affected. Pig's stomach also gave remarkable results in cases of vague gastric trouble associated with achlorhydria. One woman with pernicious anæmia had become pregnant and her blood count had never fallen below 4 million; she was taking an ounce of pig's stomach daily.

DISCUSSION.

Dr. WILLIAM BROCKBANK said that 50 per cent. of cases of pernicious anæmia returned to normal health on liver treatment and that, but for nervous manifestations, another 15 per cent. could be added to that figure. The less the liver was cooked the better; it might be cooked for a minute or two. The juice could be squeezed out of the raw liver and flavoured with orange-juice and the rest of the liver mixed with the food. Almost all patients retained some degree of anisocytosis, but platelets returned to normal. Flatulent dyspepsia, often with diarrhœa, tended to persist, even on liver diet, but was relieved by pepsin and hydrochloric acid sipped throughout meals. A persistent eosinophilia had been noted several times.

Dr. G. W. GOODHART pointed out that megalocytosis alone was not a sound criterion of pernicious anæmia. He had known a number of cases that appeared from the blood count to be typical pernicious anæmia, but did not produce the asymmetrical curve which was essential for diagnosis. This possibility was worth remembering for cases that did not respond to liver. Cases with free hydrochloric acid might respond very well to liver treatment.

Dr. VAUGHAN, in reply, said that at least one commercial extract did not affect the gastric acid and she had used this without mishap in gastric cases. The patient's diet was very important, especially vitamin B in nervous cases. The patients rarely took a balanced diet unless specially instructed.

Dr. R. Prosser White, consulting dermatologist to the Royal Albert Edward Infirmary, Wigan, and president of the Association of Certifying Factory Surgeons, has been elected an honorary member of the Vienna Dermatological Society. He is the only English recipient of this honour.

LONDON ASSOCIATION OF MEDICAL WOMEN'S FEDERATION.

AT a meeting on Feb. 24th, with Dr. LETITIA FAIRFIELD in the chair, a paper on the technique in

Low Classical Cæsarean Section

was read by Mrs. F. IVENS-KNOWLES, who reported results in 352 consecutive cases under her care from 1919 to 1930. No craniotomy on a living child or panhysterectomy except for fibroid tumours had been performed during that period. Of 352 cases, 99 were repeat operations, 67 for the second time, 25 for the third, and 7 for the fourth.

In 266 cases the indication was a contracted pelvis, with a total maternal mortality of four (1·5 per cent.); 168 were performed before or early in labour with a mortality of 1·2 per cent.; 66 late in labour (including cases of obstructed labour) with a mortality of 1·5 per cent.; 24 after instrumental induction of premature labour with no mortality; and eight after attempted forceps delivery, with one death from *Staphylococcus aureus* septicæmia after two separate attempts at forceps delivery. Fourteen cases were operated for eclampsia and other toxæmias with one death (coma), and five for accidental hæmorrhage with one death. Central placenta prævia was the indication in 25 cases. All the mothers survived, and only two infants were stillborn. Other conditions—fibroid tumours, ovarian cysts, atresia of the cervix, excessive size of the fœtus, brow presentation, advanced age of the mother, and bicornuate uterus—accounted for 27 cases, with no mortality. Ten cases were for cardiac or pulmonary disease, with one death from sepsis; the fœtal mortality was 8·8 per cent. The number of primigravidæ was 129, and of multigravidæ, 223. Of the latter 12 had previously had a craniotomy, and 40 had had stillbirths. Twenty-nine had had one stillbirth, 10 had had two, and one had had three. Cases operated upon early in labour showed a very low morbidity, whereas cases of obstructed or protracted labour showed a morbidity-rate of nearly 50 per cent. Two cases were known to have ruptured in a later pregnancy, both at about 28 weeks, and both cases of advanced chronic nephritis. The husband of one patient had refused sterilisation. In one repeat operation, where a bulging of the membranes was seen at operation, the patient was syphilitic, and her first operation had been done when she was in extremis from obstructed labour. It was noteworthy that even in cases where the operation had been performed late in labour and the puerperium had been morbid the uterine scar was sound. Six cases were known to have stood the test of vaginal delivery, two only requiring forceps.

After careful consideration of the results obtained, Mrs. Ivens-Knowles was of opinion that there was much to be said for the low classical operation, which was rapid, easy, and could be adopted for all cases, even when the head was firmly fixed as in a funnel pelvis. It was certainly advantageous to the child. Enough time had not elapsed for statistics to show whether uterine rupture was less frequent after the lower segment operation, but a case had been reported by Ridler where the upper segment scar held in a later pregnancy while the lower segment itself had ruptured, and the extraperitoneal operation appeared to be followed by a high morbidity-rate from suppuration of the abdominal wound, uterine infection, phlegmasia alba dolens, and vesical fistulæ. A death from venous hæmorrhage between bladder and cervix in the transperitoneal operation had been recorded.

REVIEWS AND NOTICES OF BOOKS

Anatomy in the Living Model.

By DAVID WATERSTON, M.A., M.D., F.R.C.S.E., & F.R.S.E., Bute Professor of Anatomy in the University of St. Andrews. London: Hodder and Stoughton, Ltd. 1931. Pp. 255. 25*s*.

A well-written book by a prominent anatomist dealing with the material in a new and interesting way. It aims at helping the student to examine the living subject both at rest and in action, pointing out the reasons for the changes to be observed in passing from one of these states to the other and incidentally affording much side information in the process. Description of particular parts of the body is preceded by an excellent general account of the skin and its associated formations, functions, and conditions; Prof. Waterston gives some presentations of arterial areas which we think have remained unnoticed since Madame Philippe Belloc published a monograph on the subject some years ago. The regions of the body are studied separately, their surface appearance and relations being dealt with first, the alterations in movements and the mechanics involved in actions at joints being considered subsequently. These sections should give the reader a comprehensive idea of what movement is taking place at each joint.

The text is amplified in the sections on the head and neck and trunk by the inclusion of plates produced by orthogonal projection; these, being drawn from various dissection stages in the same fixed subject, admit of tracing and superimposition if required. Prof. Moody some years ago brought forward numerous X ray photographs taken from Californian students which illustrated his view that the normal positions of abdominal viscera are frequently put at much too high a level. British surgeons and anatomists as a whole have not yet been able to see their way to admit this so far as British bodies are concerned, and we observe that Prof. Waterston gives Dr. Moody's findings in addition to his own but expresses no opinion on them.

Apart from its value to the clinician we think the book might find a place with the young student, for he could follow much of it on the body he is dissecting, and his more recent acquaintance with details of structure would be of help to him when he is studying the function here dealt with. We note in modern works a growing tendency to stress function at the expense of structure. Of this we cannot approve; function should go with structure not in place of it, and one is just as important as the other. The illustrations are good and clear; we would like to see added to them a comparative chart of segmental and root distributions. The book is well produced and we welcome it as an excellent effort to vivify the student's anatomy.

Philosophy of a Biologist.

By LEONARD HILL, F.R.S. London: Edward Arnold and Co. 1930. Pp. 88. 3*s*. 6*d*.

Sir Leonard Hill has written an up-to-date version of the 104th Psalm from the point of view of one who has spent a lively and productive life in experimental biology. His booklet is a vivid appreciation of the glorious majesty of the world as science sees it, of the oneness of everything alive and dead, and of his conviction that behind it all is some infinite eternal power which is often called God.

Normale Anatomie des Kopfes im Röntgenbild.

(Radiologische Praktika, Vols. XII. and XIII.). By KARL GOLDHAMER. Leipzig: Georg Thieme.
Part I. 1930. With 30 photographic plates and illustrative schemas, and 15 projection diagrams. M.120.
Part II. 1931. With 44 photographic plates and illustrative schemas and 26 projection diagrams. M.120.

INTRACRANIAL surgery in its rapid development during the last 20 years has owed much to radiology, and radiographic examination of the skull is now regarded as an essential part of the investigation of every case of intracranial tumour. The technical excellence of radiograms of the head is nowadays so satisfactory that positive information can be obtained in about half the cases investigated, though it is not always of equal value. There is a tendency, however, to push interpretation of skiagrams beyond justifiable limits, and it is probably true that at the present day more negative surgical explorations for intracranial tumour are undertaken from faulty radiological interpretation than from any other cause. What is wanted is a greater knowledge of the normal radiological appearances of the head, such as these atlases set out to provide. Dr. Goldhamer has collected a series of radiograms which demonstrate clearly what may be displayed by X rays of the anatomical features of the normal skull. They have been taken from various aspects, and for each aspect there is figured a radiogram of the dried skull, another of the skull of a living person, and diagrams illustrating in two dimensions the position in which the skull or head was placed when these pictures were taken. Each radiogram is provided with a skeleton one on transparent paper, and to this the author has supplied an elaborate key, in four languages, from which the identity of any line or area may be ascertained.

The first volume is planned to consist mainly of general views of the skull as a whole in the lateral, postero-anterior, and antero-posterior positions, and is particularly noteworthy for displaying the variation in radiological appearances that may be obtained by slight alterations in the position of the head. For example, if a radiologist wishes to know what position of the head will best show the foramen magnum in a radiogram he has only to study the photographs in this atlas. The second volume is concerned with the radiological appearances of particular parts of the skull, especially the orbit and the temporal bone, and also of the bones of the face. It shows convincingly the value of the author's parieto-orbital view in demonstrating the optic foramen, and it provides a useful comparison of the methods of Schüller, Stenvers, Mayer, and Fischer for displaying the various portions of the temporal bone. The author relies on single films and, with others of the Vienna school, does not appear to have appreciated the value of stereoscopic radiography in the skull.

These volumes are produced in magnificent style by Georg Thieme. The radiograms of the dried skull are uniformly excellent; those of living patients are below the standard that we have become accustomed to look for in this country. The two volumes contain much information that will be of value to those who are beginning work of this type; more experienced radiologists will find them extremely useful as books of reference.

The Science and Practice of Surgery.

Third edition. By W. H. C. ROMANIS, M.A., M.B., M.Ch. (Cantab.), F.R.C.S. Eng., F.R.S. Edin., Senior Surgeon in Charge of Out-Patients, St. Thomas's Hospital, and PHILIP H. MITCHINER, M.D., M.S. Lond., F.R.C.S. Eng., Surgeon in Charge of Out-Patients, St. Thomas's Hospital. In two volumes. London: J. and A. Churchill, 1930. Vol. I., pp. 772; Vol. II., pp. 950. 14*s*. each volume.

THE appearance in a third edition of this well-known text-book of surgery indicates that it has attained the popularity that it deserves. It covers the whole ground of surgical pathology, surgical anatomy, diagnosis, and treatment with an admirable brevity which leaves nothing of importance unmentioned. The authors have ably avoided the dogmatism which mars so many text-books of surgery, and have managed to separate fact from theory and personal predilections from accepted practice. The illustrations are profuse and good, the printing, paper, and binding excellent. A noteworthy feature and one of great value to the student or practitioner using this book as a work of reference is the inclusion in each volume of an index of 73 pages. This is one of the best text-books of surgery that the student can read for his examinations or that the practitioner can keep on his shelves for reference in doubt or difficulty.

Public Health Practice in the Tropics.

By J. BALFOUR KIRK, M.B., Ch.B., D.P.H., D.T.M. & H. With 80 illustrations. Churchill's Empire Series. London: J. and A. Churchill. 1931. Pp. 498. 15*s*.

ATTEMPTS made to confer on primitive societies the benefits of modern hygienic progress are beset with many obstacles. In order to explain the difficulties and to suggest measures of circumventing them, Dr. Balfour Kirk, who is Director of the Medical and Health Department of Mauritius, has written this well-supported treatise, and, in doing so, has been guided by considerations of actual practice. He deserves congratulation for having produced such a comprehensive piece of work. It is divided into two parts, the first on preventive medicine and the second on sanitation. Preventive medicine in this book covers most human infections, bacterial and intestinal, beri-beri, protozoal diseases, small-pox, venereal diseases, tuberculosis, undulant and yellow fevers. The sanitation section includes housing and town-planning, schools and school hygiene, milk and meat, water-supplies, public latrines, disposal of excreta, refuse, and disinfecting.

Dr. Balfour Kirk writes with a facile pen and provides information which is accurate and notably up to date; in fact, the highly technical data in the sanitation section is hardly available elsewhere. The tables and illustrations are admirable. We commend this work to all students of tropical hygiene.

Technique and Results of Grafting Skin.

By H. KERRICK CHRISTIE, M.S., F.R.C.S., Surgeon to Wanganui Hospital, N.Z. London: H. K. Lewis and Co., Ltd. 1930. Pp. 67. 7*s*. 6*d*.

THIS small book describes the author's experience in the use of Thiersch, Wolff, and pedicle grafting of skin. Its value lies in the advocacy of the Wolff grafting method, which is apt to be rather neglected. An unexpected measure of success seems to follow its use if the graft is retained firmly in apposition with its bed. The descriptions of pedicle and inlay grafting are hardly clear or detailed enough to enable a novice to follow out the technique. The striking success obtained by the author in skin grafts on old patients is interesting and encouraging.

Journal of Pathology and Bacteriology.

THE March issue (Vol. XXXIV., No. 2. Pp. 125–299) contains the following articles. Waldemar Haffkine (1860–1930), by W. Bulloch. An interesting account of the beginnings of preventive inoculation with bacilli and of the remarkable man who introduced vaccination against cholera and plague into India.—The Precipitation of Diphtheria Toxoid by Potash Alum, by A. T. Glenny and Mollie Barr.—The Rate of Disappearance of Diphtheria Toxoid Injected into Rabbits and Guinea-Pigs: Toxoid Precipitated with Alum, by A. T. Glenny, G. A. H. Buttle, and M. F. Stevens. In these two important papers from the Wellcome Laboratories at Beckenham, it is shown that diphtheria toxoid may be purified and concentrated by precipitation with potash alum and that the resulting precipitate forms a superior antigen for immunisation owing to its insolubility and retention in the body.—Malignant Neoplasm of Spleen and Bone-marrow with Metastases in Liver, by C. G. Paine (Sheffield). A hæmendothelioma.—The Intracutaneous Method of Testing Diphtheria Toxin and Antitoxin, by A. T. Glenny and Mona Llewellyn-Jones (Beckenham). A detailed technical account of the most recent method of titrating diphtheria antitoxin which is more convenient, rapid, and accurate than the subcutaneous method, and can detect 1/50,000th of a unit.—Latent and Occult Tuberculous Infection of Bronchial Glands, by W. M. Cumming, S. J. Hartfall, and J. G. Thomson (Leeds and Grassington). Bronchial glands from 108 non-tuberculous subjects were examined histologically and inoculated into guinea-pigs. Tubercle bacilli, of human type, were isolated from seven, of which three were histologically positive. None of 101 cases bacteriologically negative showed a histological lesion.—The Effect of Diet in Epidemic Infections in Mice, by W. W. C. Topley, M. Greenwood, and J. Wilson (London).—Changes in the Blood-Sugar and Blood Phosphorus in Rabbits following the Injection of Suspensions of *B. aertrycke*, by M. E. Delafield (London). Hyperglycæmia followed by hypoglycæmia in which the animal dies.—Astrocytoma of the Cerebrum, showing Extensive Involvement of the Opposite Cerebral Hemisphere, by E. A. Linell and K. G. McKenzie (Toronto). The growth was found microscopically to extend far beyond the naked eye limits.—The Intracutaneous Method of Testing the Toxins and Antitoxins of the "Gas Gangrene" Organisms, by A. T. Glenny, Mona Llewellyn-Jones, and J. H. Mason (Beckenham). The method works well for *B. welchii*, *B. œdematiens*, *B. histolyticus*, vibrion septique, and the lamb dysentery organism.—An Analysis of the Data Collected by the Status Lymphaticus Investigation Committee, by M. Young and H. M. Turnbull (London) (see THE LANCET, March 14th, p. 593).—Metastasis of the "Benign" Giant-celled Tumour of Bone (Osteoclastoma), by S. C. Dyke (Wolverhampton). A primary tumour in the patella gave fatal secondaries in lungs, kidneys, and lymphatic glands after five years.—Malignant Osteoclastoma, by J. W. Orr (London). Primary growth in lower end of femur, secondaries in lungs.—A Jenner Stain for Sections, by H. M. Turnbull (London).—A Simple Warm Stage for Class Purposes, by R. A. Webb (Cambridge).—Giant Colony Culture, by J. F. D. Shrewsbury (Birmingham). Colonies up to 1½ inches in diameter.—Bulk Staining of Museum Specimens, by H. W. C. Vines (London). Hæmatoxylin and Sudan III.—Obituary Notices of G. H. K. Macalister (portrait), Chung Yik Wang, and J. H. Teacher (portrait).

THE LANCET.

LONDON: SATURDAY, MARCH 28, 1931.

THE SALE OF PROPRIETARY MEDICINES.

IT would be almost true to say that there is no law governing the sale of proprietary medicines. Provided that the seller takes out a patent medicine licence, costing five shillings a year, and that certain dutiable medicines bear an Inland Revenue stamp, showing that the duty has been paid, there is no check on the traffic in medicines or nostrums, unless they contain a scheduled poison. In the latter case the medicines may be sold only by registered chemists, and the package must be duly labelled in accordance with legal requirements. The majority of proprietary medicines do not contain any scheduled poison, and thus we live in a country in which it costs more for the right to keep a dog than to physic a neighbour, which does not seem reasonable since the dog, besides being a useful animal, is the friend of man. At various times attempts have been made to protect the public alike from its own credulity and from the wiles of the nostrum vendor. The most notable attempt in our time was the introduction into Parliament of a Bill based upon the recommendations of the Select Committee of 1914, reprinted as a special supplement to THE LANCET of Jan. 10th, 1925. This Proprietary Medicines Bill was read a second time in the House of Lords on August 6th, 1920, and it is regrettable that it has not been reintroduced. The reason is, no doubt, that it embodies sufficient material for controversy to cause any Government to hesitate to allot time for its discussion. Another Bill has now been drafted by the health advisory committee of the Labour Party. Its sponsors hope to find an opportunity of introducing this measure in due course, but it is difficult to believe that if a Government Bill having a similar purpose has no chance of consideration a private member's Bill of a still more far-reaching character has any chance of making its way through all the parliamentary stages in the life of the present administration. They may be hoping that its mere introduction will convince the public of the need for legislation, and so lead to the reappearance from its pigeon-hole of the well-considered Bill of 1920.

The draft Bill, which in respect of the majority of its provisions is the same as the 1920 measure, proposes to set up a register of owners of proprietary medicines and owners of proprietary surgical appliances as well as registers of proprietary medicines and surgical appliances. It seeks to make it an offence for any person to manufacture any proprietary medicine unless he is registered as the owner of the medicine or is a person authorised by the registered owner. The medicine itself would also be required to have a number assigned to it on the register. The Bill would make it an offence to sell or to advertise for sale any medicine or surgical appliance for the cure of deafness or rupture or for the cure or relief of the following diseases or infirmities: cancer, consumption, lupus, fits, epilepsy, amenorrhœa or other diseases peculiar to women, diabetes, paralysis, locomotor ataxy, Bright's disease. These are the diseases specified in a schedule to the Bill of 1920, and it is provided that any other disease or infirmity may be added to the schedule by the Minister of Health after approval by Parliament. It is also sought as before to prohibit the advertisement to the public of articles for producing abortion or miscarriage; the prohibition is now extended to claims for the cure of sexual weakness, or for the promotion of sexual virility in the male and sexual desire in the female, or for other specified purposes relating to sexual excess. It would become an offence for the registered owner or vendor of any proprietary medicine or proprietary surgical appliance to invite any person to enter into correspondence with him on any ailment or to offer to give advice to any person on the treatment of any ailment. The publication of fictitious or misleading testimonials would be stopped. If a statement is made that a proprietary medicine is recommended by a duly qualified medical or dental practitioner, the name and qualifications of the practitioner must be given. If quotations are made from the medical press to support an advertisement the precise reference must be given. It would be an offence to make a statement calculated to induce any person to believe, contrary to the fact, that a proprietary medicine was discovered, invented, or compounded by a duly qualified medical practitioner. In the case of any synthetic drug, sold as a proprietary medicine, such designation or description as may be directed by the Minister of Health must appear on the label. Finally the Minister would be empowered to remove from the register any medicine or surgical appliance which appeared to be likely to cause injury to health.

The proposed Bill may seem to many people to constitute a counsel of perfection. Short of requiring the disclosure of the formula on the label it goes nearly as far as it would be possible to go in a perfect State. It should be noted, however, that the keeper of the registers is prohibited, under a maximum penalty of 12 months imprisonment or a fine of £500 or both, from furnishing to any person, or even in a court of law, any copy of or extract from any entry in the register. A formula would remain just as much a secret as it is at the present time. But apart from this the draft Bill contains provisions likely to give anxiety to vested interests. If it can be used as an instrument for persuading the Government to reintroduce the Bill of 1920 it will have served its purpose.

RENEWED INTEREST IN VITAMIN A.

THOUGH one of the first accessory food factors discovered in 1912 by Sir GOWLAND HOPKINS was appropriately named vitamin A, it was not many years before the two main properties ascribed to this fat-soluble vitamin were found to be separable. The label A was retained for the factor, the absence of which spelt failure of growth and, in rats, liability to xerophthalmia; while the antirachitic factor which was found often but not invariably associated with vitamin A was called vitamin D. For many years the newcomer deflected attention from the growth-promoting factor, and this is hardly astonishing. The apparently conflicting results obtained by workers who had investigated the causation of rickets from different standpoints; the unexpected mutual support for the two rival theories which arose from the discovery that exposure to U.V. light or internal administration of vitamin D were equally potent remedies; and the explanation afforded by the successful attempts to activate ergosterol, the parent substance of vitamin D, by U.V. rays is one of the most dramatic stories in modern medicine. But in recent years there has been a revival of interest in vitamin A. In our own columns this week Dr. H. A. HARRIS shows how in the young animal the proper differentiation of bone and marrow cells depends on an adequate supply of this vitamin. And in the report of the Medical Research Council for 1929–30 [1] special attention is drawn to the work on this factor of Prof. E. MELLANBY and Dr. H. N. GREEN in Sheffield, Dr. S. S. ZILVA, Miss E. M. HUME, and Mrs. SMEDLEY MACLEAN, D.Sc., at the Lister Institute, Dr. T. MOORE at Cambridge, and Prof. J. C. DRUMMOND at University College.

The subject has been approached from two opposite angles. Biochemical studies have been directed towards the discovery of the parent substance of vitamin A, and clinical experiments have been undertaken to test the value of this vitamin in increasing resistance to infection. The clinical experiments are not yet far advanced. Prof. MELLANBY and his co-workers have started from the basis that vitamin A may have primary value not only in defending the body against infective disease but also in promoting recovery after infection has been established. At the Jessop Maternity Hospital, using a concentrate prepared and supplied by Messrs. Lever Bros., they have achieved results which suggest that the chances of recovery from puerperal fever are notably increased by treatment with vitamin A, and, moreover, that this vitamin has preventive value against puerperal infections. They go so far as to hint the possibility that intensive vitamin A therapy during pregnancy may offer a simple means of reducing the maternal morbidity-rate. Even if this hope is not fulfilled, the association between the absence of this factor and liability to bacterial infection may provide the key to less complex problems. Various tests now in progress should soon show whether it has practical importance. In the Royal Air Force a certain number of volunteers doing indoor and outdoor work are being given a regular course of vitamin A, and their liability to colds and other ailments during the winter months are being compared with that of a corresponding control group of men. Another inquiry has been set on foot, in coöperation with the medical staff of the London County Council, to ascertain the value of this vitamin in the treatment of otitis media after scarlet fever and in the prevention of dangerous infective sequelæ after the common infective fevers. In Sheffield it is being tried on patients with pneumonia and rheumatic fever.

Explanation of the mechanism of any effects observed must await the results of biochemical studies which are being prosecuted with vigour throughout the world. More than ten years ago American workers found that vegetable substances containing the yellow pigment known as carotene produced the effects of vitamin A in animal experiments, whereas colourless vegetables were less effective in this respect. Miss K. COWARD confirmed these results, finding that material from the yellow part only of the pheasant's eye narcissus was an effective addition to a vitamin A-free diet. Animal fats rich in vitamin A, however, were found to contain no carotene, so the connexion remained uncertain. The more recent observations of Prof. H. v. EULER in Sweden, that carotene can replace vitamin A in the diet have led to renewed activity in the search for the parent substance of this vitamin. Prof. MELLANBY and Miss J. HOPWOOD have found carotene to be as potent as vitamin A in promoting functional improvement in cases of experimentally produced degeneration of the spinal cord. It has also been used with success to replace vitamin A in its specific action against spontaneous infection in the rat. Prof. DRUMMOND has found evidence that the pigment is converted into the vitamin somewhere in the body, and Miss HUME and Dr. SMEDLEY MACLEAN have confirmed their association. The experiments of Dr. MOORE suggest strongly that carotene is a precursor of vitamin A. His claim that the liver oil of rats and cows cured of vitamin-A deficiency by carotene show a quantitative conversion of pigment into vitamin is of special importance in view of recent German work in which a quite different precursor to the vitamin is suggested. The international concentration of effort to discover the immediate source of vitamin A gives reason to hope that the biochemistry will at least keep pace with clinical practice, and that vitamin A if it comes into clinical use will not come as a purely empirical remedy.

[1] See THE LANCET, March 7th, p. 547.

THE POST-ENCEPHALITIC.

THE treatment and general management of the post-encephalitic patient has always been a difficult problem, and it was a boon to the London community when the Metropolitan Asylums Board

made provision for a number of these cases at the Northern Hospital, Winchmore Hill. This hospital is now under the control of the London County Council, and in his first report[1] to that body the medical superintendent, Dr. G. A. BORTHWICK, has given a description of its organisation and working, and has also presented a brief survey of the present state of our knowledge of epidemic encephalitis. At first provision in this special institution was made only for children, but since May, 1929, accommodation has been available for some adults, and the question of setting apart more pavilions for adult cases is now under consideration. There has been a continued decline in the number of young children admitted to the unit, while a large number of adults of both sexes are awaiting admission. The treatment of post-encephalitic states can, of course, only be palliative, since the symptoms are consequences of organic cerebral disease, and nothing can be done to restore the destroyed or damaged structures in the brain. But we do not perhaps sufficiently recognise how much palliative treatment can accomplish. Of the patients that have been in this hospital during the five years it has been devoted to post-encephalitic cases, 45 per cent. have been classified as suffering from disorders of behaviour, and 46 per cent. from the parkinsonian syndrome. Dr. BORTHWICK deals separately with the treatment of cases in these two classes.

The changes in character and morals, the restlessness, querulousness, destructiveness, the vagrancy, pilfering, masturbation, obscene conduct, and so on, that commonly follow epidemic encephalitis in children are attributed to loss of inhibition over crude instinctive reactions. The general curriculum of the children's section, which is under specially chosen teachers, is based on the endeavour to avoid the circumstances that evoke strong instinctive reactions and to develop the patient's powers of mental diversion, because the child's capacity to inhibit or cut short these morbid impulses by the direct power of the will seems undeveloped or lost. Punishment of any kind is without effect and is never resorted to in the unit. All the children have routine lessons, including instruction in handicrafts, on five days a week. Holidays are given, but during and immediately after the holidays some deterioration in conduct and discipline is always noticed. The milder cases have done well with the orderly routine of the hospital school and whilst in residence have almost reached normal standards of behaviour; the more severe cases have benefited to a certain degree by the environmental treatment and, taking the cases as a whole, the stay in hospital has been greatly beneficial to the majority. Two drugs, bulbocapnine and to a less extent lobelia, have been found to have the effect of reducing the patient's excessive instinctive activities, and in consequence of their use the work of the teachers and staff has been made easier. Drug treatment is however only palliative and no cure is claimed. Even with bulbocapnine a few cases of severe behaviour disorder have been so unmanageable as to require discharge. Many of the cases of disordered behaviour have gradually changed into parkinsonism, and the very significant observation is recorded that in such cases the tendency to disorder of conduct ceases as generalised parkinsonism comes on. For the parkinsonian syndrome medicinal treatment with hyoscine or with stramonium has been found most effective. The dried extract of stramonium (U.S. Pharmacopœia) given in pill in doses of 0·25–1·0 g. or more three times a day, has produced very good results, the muscular rigidity in many cases being completely relieved; helpless patients have become able to walk, and to dress and feed themselves. The dose has to be a large one, but these patients show exceptional tolerance of the drug and no deleterious effects have resulted from its prolonged use. Many other drugs have been tried without success. Exercises, massage, passive movements after hot bathing, and other forms of physiotherapy have been of some benefit. Many of the milder parkinsonian cases will ultimately be discharged with a reasonable hope of their being able to lead a useful life outside the institution under continuous drug therapy.

It is, we believe, the impression of those who see these cases in the out-patient departments of hospitals and elsewhere that the total number of post-encephalitic patients is less than formerly. The incidence of epidemic encephalitis has shown a marked decline generally throughout the world during the last few years. In 1924 the number of cases notified in England and Wales was 5039, in 1929 it was 1036. The number of deaths attributed to epidemic encephalitis has not, however, decreased in proportion; in 1924 the figure was 1407, in 1929 it was still 1037. It seems likely that the latter figure must represent almost entirely deaths among the chronic sufferers of the sequelæ of the disease. Not only has the incidence of epidemic encephalitis diminished, but the severity of its manifestations in the acute stage has also steadily diminished; death during the acute stage is now very uncommon. A neurologist who attends at one of our largest municipal hospitals, as well as neurological and other hospitals, has informed us that he has not, for several years, seen or known of a case of encephalitis lethargica fatal during the acute stage. It seems then that the death-rate among the post-encephalitic patients is a high one. It may be noticed that in 1929 the number of deaths was almost identical with the number of cases notified, so that for every new case notified an old case died off. Unfortunately the notified cases do not represent the whole incidence, and therefore the total number of sufferers from the after-effects of encephalitis was still probably increasing in 1929. The experience of 1930 suggests that when the figures for that year are available they will show a further reduction in the number of notifications and no great change in the number of deaths. In other words, we may hope that the stage has been reached at which the total number of post-encephalitic patients living has begun to decline.

[1] London: P. S. King and Son. No. 2811. 6*d*.

ANNOTATIONS

DISTRICT NURSING IN LONDON.

EVERY practitioner who has worked in one of the poorer districts of the metropolis will be willing to testify to the tremendous debt he owes to the district nurse. On her quiet and cheerful competence depends more than half his success, and from his shoulders she lifts an incalculable burden of responsibility and anxiety. The London County Council has just published a survey of district nursing in its area [1] by Dr. Margaret Hogarth. The associations working in London fall into three main groups: those affiliated to the Queen's Institute, independent associations, and the nursing branch of the Ranyard Mission. The standard of nursing was considerably raised in 1914 by the formation of the Central Council for District Nursing, a voluntary organisation with advisory powers only, but with the control of large charitable funds, which enables it to lay down standards. There are now less than half a dozen nurses who are not fully trained. The Queen's Institute, which has over 700 affiliated associations throughout the country, governs 22 of the 32 associations in London, which means that the nurses in these associations have had six months' additional training to teach them how to adapt their hospital standards to domiciliary work. The Ranyard nurses also have six months' additional district training. The result is a really remarkable service. Dr. Hogarth observes:

"The further I investigated the domiciliary nursing of London, the more I was impressed with the tremendous amount of individual and collective voluntary effort expended in securing for the poorer classes a free nursing service of the highest quality obtainable . . . . The standard of nursing is high and is maintained at a consistently high level . . . . so that there is no difference in the quality of nursing at the disposal of the poor and of those who are in a position to pay for the services of a private nurse, except that the nurse has to do more for a patient where not only the comforts but the actual necessaries of life are hard to procure."

The superintendents are paid from £80 to £170 a year with board, lodging, uniform, and laundry, and the nurses receive from £63 to £75 a year. In some places there are no allowances and the salary is about £200. After 21 years' service a Queen's nurse receives a pension of £30 a year, reduced to £14 at the age of 65. The Ranyard Mission also has a contributary pensions scheme, but some of the independent associations have not. The average cost per visit is 1*s*. 4*d*., and the average cost per nurse, including all ordinary administrative expenditure, is £195 per annum. The main sources of income to cover these expenses are voluntary contributions, patients' payments, and public funds. Subscriptions and donations, which demand great effort to raise, meet less than half of the expenses, and rather less than one-fifth is obtained from the patients. Only in exceptional circumstances does a district nurse attend a patient who can afford the full fee of 5*s*. per visit. A provident system of payment is widely used by the Ranyard nurses, each household contributing a few pennies weekly to ensure free nursing attendance. A great grievance of the associations is that the income from patients' contributions is diminishing with the growing popularity of the Hospitals' Savings Association; when the patient leaves hospital the almoner arranges with the nursing association for further treatment, which the patient assumes will be covered by his contributions to the hospital. Just over one-third of the income comes from public funds; borough councils pay for the nursing of notifiable diseases, pregnant and nursing mothers, children under five, maternity cases and other special services, or else contribute an annual grant.

The nurses will undertake almost anything; the majority of their cases are medical, while about 30 per cent. require surgical care. The treatment of diabetes by insulin falls heavily upon the district nurses, as does also the care of cancer and senile cases. No board of guardians employed its own nurses, and poor-law patients who could not be admitted to institutions were referred to the district nurse. Although the greater part of the midwifery of London is undertaken by independent midwives and training schools, most of the district nurses hold a C.M.B. certificate and some of the associations definitely undertake obstetric work and maternity nursing. Their nurses also give general rubbing treatment for simple orthopædic cases, and a few of them attend infant welfare centres or other clinics. They undertake the home nursing or home visiting of tuberculosis by special arrangement with the borough; they nurse insured persons for approved societies and they coöperate in the school nursing service, for which the London County Council employs a special staff of 360. They look up children whose attendance at the minor ailments centre is irregular and visit those who have been operated on for tonsils and adenoids. As Dr. Hogarth remarks, the educational value of the visits is an outstanding feature. Each visit is the practical application of an immense amount of theoretical teaching.

"A district nurse's visit to a tuberculous patient is illuminating. She sees to the comfort of the patient, the disposal of the bed, the collection and disposal of the sputum, the care of the crockery and the food. Everything is made simple and easy and at every visit the education of the family proceeds. A nurse's influence permeates a whole neighbourhood, and her opinion is respected in proportion to her immense practical value. From what I have seen of the work of these nurses in the homes, I do not consider that the educational and preventive effect of a nursing visit can be over-estimated. . . . I am of opinion that for any domiciliary nursing of patients under the new arrangements the services of these nursing organisations should be retained and that a district nurse should be present at each medical session at district offices or dispensaries."

This magnificent work depends, Dr. Hogarth thinks, very much on the type of woman found at the head of the work. A striking tradition of altruism pervades the service and the work is more a vocation than a profession. For this reason, if for no other, it is important that the devotion of the nurse should not be exploited, even in the interests of the public.

[1] L.C.C. Survey of District Nursing in the Administrative County of London. P. S. King and Son, Ltd., 14, Great Smith-street, S.W.1. Pp. 18. 1*s*.

FRANCIS GALTON.

How Prof. Pearson manages to keep up his output of research work has been a wonder for some time, and now with the publication of the third and final instalment [1] of his Life of Galton he has added to English literature what we consider to be the best account of a scientific man that ever has been. He tells us in the preface how he has been able to do this: "I have written my account," he says, "because I loved my friend." Galton was a man of endless

[1] The Life Letters and Labours of Francis Galton. By Karl Pearson. London: Cambridge University Press. 1930. Vol. iii. (in two parts). Pp. 673. With 59 plates and other illustrations. 69*s*.

curiosity and exceptional intelligence; he started a variety of hares for other people to chase, and almost everyone who reads these stately volumes will, we imagine, be surprised to find that it was Galton who put this or that topic on the scientific stocks. We hope that some day the collected edition of Galton's writings, once contemplated and then abandoned, may come within the capacity of his Foundation. Meanwhile, we have in substitute, in the second and third volumes of the Life, a critical and annotated account of these writings, and the commentary adds a value which a bare reprint would wholly lack. The present volume is of particular interest in drawing together the main and more permanent interests of the man. Chapter 14 shows how Galton groped his way into the ideas of correlation and the application of statistics to the study of heredity—the subject out of which Prof. Pearson and his pupils have developed a mathematical discipline which Galton always refused to attempt to follow. Chapter 15 deals with fingerprints and is mostly of technical interest. And in Chapter 16 headed "Eugenics as a creed and the last decade of Galton's life," we come to the culmination of the whole tale. It tells us what Galton stood for as well as what he did. Eugenics (why do not we call it "Galtonism"?) is, in the words of his will, the study of "the agencies under social control that may improve or impair the racial faculties of future generations physically and mentally" and, with any number of offshoots and collateral excursions, it was his abiding concern throughout his mature life and the glow of an active old age that closed after a few days' illness at 88. Prof. Pearson need make no apology for the freedom with which he appears in these closing scenes; the correspondence between his master and himself gives us a picture which could have been drawn in no other way, and which we are glad to have for both their sakes. All through, and especially in the final long chapter, which gives a selection of Galton's letters throughout his life, we get to know something of what Galton was: how he took Herbert Spencer to the Derby, how he liked to cut a cake, his studies in tea-making, and above all, his love for his family and his friends—personalia as germane to the complete biography as is the precise scholarship of the abundant footnotes.

ACUTE POLIOMYELITIS IN GREECE.

In a communication to the Société de Thérapeutique of Paris Dr. Petzetakis,[1] of Athens, states that a considerable number of cases of acute poliomyelitis were observed in Greece last year. According to the notifications received by the Greek Ministry of Health the number was about 300, of which nearly 70 were in Athens. Most of them were observed in June and July. These figures, however, Petzetakis says, do not give a clear idea of the real incidence of the disease, for they merely represent the notified cases with paralysis and do not include the mild and abortive attacks which are of such great epidemiological importance. In most cases the onset was sudden with high fever. In Athens the disease was not found in the centre of the town but in the outskirts. In several instances, of which Petzetakis himself saw two examples, it occurred in the same family. He also had an opportunity of observing formes frustes in which the symptoms were general pains, diarrhœa, headache, and hypertension of the cerebro-spinal fluid without actual paralysis. In two cases, of children aged 2½ years and 3½ years respectively, convalescent citrated blood was given. The first child, whose symptoms were diarrhœa, fever, retention of urine, paresis of the muscles of the neck and feet and cerebro-spinal hypertension and lymphocytosis, was given 100 c.cm. by intramuscular injection in the course of five days. Twenty-four hours after the first injection the retention of urine passed off and subsequently the other symptoms rapidly subsided, so that by the end of the first fortnight of the disease recovery took place without diathermy, actinotherapy, or electrical treatment. The fever, however, persisted and the temperature did not become normal until the twenty-eighth day. In the second case the symptoms were those of Landry's paralysis. The onset was sudden with high temperature, and within a few days the muscles of the abdomen, bladder, neck, respiration, and heart were affected. The cerebro-spinal fluid showed considerable hypertension and increase of albumin and sugar as well as polymorphonucleosis which was not replaced by lymphocytosis until the twelfth day. 155 c.cm. of citrated blood, of which 10 c.cm. was given intrathecally and the rest intramuscularly, were administered in the course of eight days, with the result that the respiratory and cardiac symptoms rapidly disappeared, leaving only paraplegia of the lower limbs. The fever, however, persisted as in the previous case, and there was still considerable constitutional disturbance. Pettit's serum which had just arrived at Athens was then given, 100 c.cm. being injected into the sacrolumbar muscles in the course of four days, with the result that the temperature rapidly fell, the general condition considerably improved, and there was a return of the right plantar reflex. The case suggested that apart from its recognised efficacy at the onset of the disease Pettit's serum may be of value even at a late stage.

[1] Bull. Soc. de Thér., Feb. 11th, p. 79.

NO INTRODUCTION NEEDED.

A PREFACE rarely does more than spoil a book a little, and the harm is mitigated by the probability that it is only read by the reviewer. But we could name several books which have been seriously marred by the author's wish to get someone important to explain why the book came to be written. In the present case the explanation defeats the object of the book.[1] Not that we do not share Dr. Kimmins's admiration of the way the author "brings into play material from a variety of sources to support and amplify his main purpose, without the risk of rousing any prurient curiosity in the mind of the child." But Dr. Kimmins, while admitting and endorsing the author's contention that children should read the story for themselves, evidently forgets that his foreword will also be available to child readers and that his very mention of "prurient curiosity," "evil effect," "information obtained from tainted sources," and "emotional reaction to sex," destroys its value. We trust that a new edition will speedily be called for and that it will be issued without any foreword. The book itself seems to us faultless. In less than 50 octavo pages of large type Mr. de Schweinitz explains the processes which have puzzled all children in all times, without attempting to evoke any emotion at all, certainly not that gratitude for maternal care or admiration of divine achievement which overflows from the final perorations of many such books. One can imagine a child, having satisfied a natural

[1] How a Baby is Born. By K. de Schweinitz. With an appreciation by Dr. C. W. Kimmins. London: George Routledge and Sons. 1931. Pp. 95. 2s. 6d.

curiosity, forgetting for years much of the accurate and detailed information supplied, and that is the highest praise we can give this book.

ELECTRO-SURGERY IN GYNÆCOLOGY.

THE use of high-frequency currents in gynæcology has been closely considered in a long paper by Robert Fowler of Melbourne.[1] Generally speaking, he says, the undamped current has good cutting qualities and is used for electro-section, while highly damped currents will desiccate or coagulate tissue but will not cut. Besides these, the direct destruction of tissue by the galvano-cautery, energised by a low-frequency current, may be included under the term "electro-surgery." The equipment consists of (1) a source of alternating current, (2) a high-frequency generator with separate terminals for clinical tappings of the desiccating coagulating or cutting current, and (3) suitable electrodes with control switches in the circuit. Among his methods Fowler includes the simple process of galvano-cautery (epithermy) and "indirect endothermy" (diathermy) on a condenser couch. Of interest are the surgical operations performed by "direct endothermy," using the cutting, desiccating or coagulating current through some operating electrode, the patient resting on a large indifferent electrode pad. Among operations thus performed are simple ones like removal of a polypus, and complicated ones like pan-hysterectomy and Cæsarean section. In some cases the method seems unnecessarily elaborate for the task in hand, but many of Fowler's suggested uses seem appropriate. For example, the badly damaged "pre-cancerous" cervix appears to react well to linear cauterisation with the Oudin desiccating current or to igni-puncture; indeed, he almost goes so far as to propose that a suspicious-looking cervix should be treated as malignant until it is proved otherwise. If rapid improvement does not take place under diathermy it is recommended that radium needles should be implanted. Other apparently valuable uses for the cutting current are for severance of the vaginal vault in pan-hysterectomy—the current being slightly damped to secure hæmostasis—and for enucleation of intra-mural myomata. Coagulation is advocated for vulval warts, caruncles, and nodular enlargement of Bartholin's glands, and a combination of coagulation and cutting for the removal of vaginal or vulval growths. Fowler is against "medical" diathermy for pelvic inflammation, because he fears it may cause a flare-up.

EPIPHYSITIS IN THE HIP.

G. Darcourt points out[2] that besides the chronic affections of the hip—traumatic, nervous, infective, &c.—of which tubercle is the commonest, there are three other big groups: congenital malformations, arthritis deformans, and epiphysitis. His interesting paper deals with the last of these, which he subdivides into coxitis, affecting the acetabulum; coxa plana, affecting the femoral head; and coxa vara, affecting the femoral neck. He tries to show that all these are really the same disease, that they are errors in ossification, and that such differences as appear to exist are due to variation in the site of the lesion and the age of onset. In discussing coxitis, he quotes Froelich, who subdivides it into two varieties according to whether it involves the acetabular roof or the floor. In both varieties, he says, X rays show that rarefaction and condensation go on simultaneously, that the appearance suggests an error of ossification rather than an inflammatory destructive process, and that the alterations in the shape of the acetabulum are due to the pressure of the femoral head. If the roof is affected, then the pressure will cause it to slant and secondary subluxation will occur; if the floor is softened then the acetabulum will become deeper and the femoral head will sink further and further into it. The first variety should not be confused with congenital subluxation, because, though in this latter the acetabular roof does slant, there are no alterations in the structure of the bones as there are in coxitis; neither should the second variety be mistaken for arthritis deformans, for the femoral head retains its contour until very late in the disease. He admits that eventually both varieties progress to alterations in the shape of the femoral head and even to ankylosis, but this he attributes to secondary changes in a mechanically deranged joint.

Coxa vara is also subdivided into three types—the juxta-trochanteric, the mid-cervical, and the juxta-epiphyseal. According to Darcourt one part of the neck grows more rapidly than the other, with the result that there is a change in the direction of growth. If the upper part grows faster than the lower, and, if this happens in a young subject where the femoral neck is not well defined, the juxta-trochanteric type will be produced, with a marked diminution in the angle of the neck of the femur. Similarly, if the growth of the anterior part of the neck exceeds that of the posterior, the femoral head will grow backwards and the neck will become convex anteriorly. This happens in the mid-cervical type, where the backward displacement of the head may be so marked as to give the impression that it is stuck to the great trochanter. If the disorder starts in adolescence, when the femoral neck is well formed, the head will grow downwards in relation to the neck, but there will be no alteration in the angle of the neck of the femur. Writing on coxa plana, he begins by saying that a great deal of confusion has arisen because of the tendency to label as coxa plana all cases of flattening of the head of the femur. He points out that flattening of the femoral head is common, as a secondary development, in most affections of the hip, whether they be inflammatory, mechanical, or congenital, and is by no means pathognomonic of coxa plana, whose most typical feature is fragmentation of the femoral epiphysis. He looks upon the condition as an error of ossification and does not agree with Calot, who attributes the alteration in the shape of the femoral head to the mechanical influences associated with minor degrees of subluxation. Neither does he agree with Murk Jansen, who thinks that the femoral deformity is secondary to a congenital abnormality of the acetabulum—i.e., ischium varum. Darcourt admits that in coxa plana the head of the femur may be raised and also that ischium and even ilium varum may be present, but there is no evidence to show that these are primary causes. Indeed, several cases are on record, he says, in which coxa plana developed in hip-joints that were known previously to be radiographically normal. He contends that the X ray changes in coxa plana are far too widespread to be explained either by Calot's or Murk Jansen's theories; for, not only is the femoral epiphysis involved, but also the epiphyseal cartilage and the femoral neck, and in some cases also the acetabulum, the ischiopubic ramus, and even the tuber ischii. Darcourt does not deal at length with the ætiology of all these forms of "epiphysitis"; he merely remarks that the endocrine theory has not been confirmed, and he inclines to the

[1] Jour. Coll. Surg. Australasia, 1930, iii., 75.
[2] Actualités méd.-Chir. Paris: Masson et Cie. 1930.

traumatic and infective theories. The infection or trauma, whichever it may be, upsets the blood-supply to the growing part of the bone. If the acetabulum is attacked, then one or other form of coxitis will occur; if the femoral head, then coxa plana will develop; if the neck, then one or other type of coxa vara.

DRUG ADDICTION IN EGYPT.

In January, 1930, T. W. Russell Pasha, the Director of the Central Narcotics Intelligence Bureau of the Egyptian Government, startled the League of Nations Opium Committee by describing how Egypt had, in the preceding five years, become a nation of drug addicts. Hashish, cocaine, heroin, and morphine had been pouring into the country since 1925; "every village in Egypt had its heroin victims." Enormous profits had accrued to those engaged in this vile traffic, and several of the principal agents in the business had been traced, arrested, and convicted through the vigilance of Russell Pasha and the Egyptian police. The Director has now published the annual report of his bureau for 1930, a well-documented and illustrated volume dealing with the present situation in Egypt, the sources of the illicit traffic, the tricks of smugglers, narcotic legislation, and the active measures which have been adopted to restrict and prevent the evil which had grown in the brief space of five years to such alarming proportions. The report furnishes details of the exposure of several international gangs of drug smugglers and is embellished with the photographs of the most notorious members of this unholy alliance.

It is not surprising to find that Turkey, which is still outside any opium convention, has been a fertile source from which hashish, heroin, and crude opium have found their way into Egypt. The newly-established drug factories in Stamboul are known to be engaged in exporting enormous quantities of the alkaloids to Greece and thence to other countries. The report states "the estimated world's legitimate requirements of heroin in one year are roughly 2000 kilos, or two tons. The Turkish Government states that it exported, during six months, the total of *four tons* of heroin"; and this figure is believed to be considerably less than the total output. Elaborate tables are furnished giving the narcotics seized at the customs, or by the police, during the year 1930; the total amounts to 7800 kilogrammes, the greater part of which was hashish, largely derived from Syria. If the evidence derived from addicts themselves can be relied on it would appear from an investigation of 400 cases that heroin was the drug favoured in some 67 per cent. of the whole number. The cultivation of opium is now forbidden in Egypt and the Government, by penal laws and by active propaganda, under the able direction of Russell Pasha, is able to report hopefully of the present situation.

STUDY OF PUERPERAL INFECTION.

Queen Charlotte's Hospital has established a research and isolation department at Hammersmith for the investigation of puerperal sepsis. The authorities have wisely considered that it would be better at the present moment to spend money on making maternity safer than on providing more beds. The hospital has been built with every advantage. Each ward and room opens on to a sunny south balcony, which is made of teak and also serves as a fire-escape. All the doors are of metal or teak, since this wood is regarded as fire-proof. The wards contain from one to five beds. When a patient first comes in she is classified bacteriologically and then put in a ward with other patients suffering from the same organism. The single wards are separated by glass walls which are frosted in the middle opposite the beds so that, while the nurse can keep observation on three beds at once, the patients cannot see each other. Every ward has a little observation guichet so that the patient can be watched without being disturbed. Every bed is provided with three electric plugs: one for a lamp, one for wireless, and one for the bell. When the bell button is pressed a gentle buzzing sound is made in the passage and a red signal arm falls down, so that the nurse can see at once which bell has been rung. There are special electrical thermostats for keeping the babies' milk at the right temperature. A special bed-pan room contains sterilisers used for bed-pans alone and heated racks on which to stack the pans, so that they are never cold. Each bed-pan is numbered and used only for its own bed. Specimens are stored in cupboards opening on the outside, so that no smells enter the building. The soiled-linen bins stand on outdoor platforms, from which the linen goes down on a life to a special sterilising department.

The theatre block is full of convenient devices and is used extensively for treatment. Doorless apertures connect the central room with sterilising and sluicing rooms. There is an anæsthetic room and a recovery room, and instruments are kept in an hermetically sealed cupboard, which is made by a recess in the wall closed by a metal and glass door. The air inlet ensures the entry of warmed and completely cleansed air, and a special electrical sterilising and refrigerating plant is provided. The emergency lights are fed from a cupboardful of batteries and are switched on automatically when the main fails. Standard lamps lit by batteries can be wheeled into the theatre to give additional light. In the store room there is an ironing bench with a switch for electric irons, and all the shelves are formed by small detachable slats which slip out to be scrubbed. The resident's rooms and the rooms for the visiting staff are of the same high standard as the rest of the hospital, and the waiting room is provided with a couch on which an anxious relative can be put up for the night.

The site covers several acres, and the hospital hopes eventually to provide accommodation for 258 more beds, a number of them being prenatal beds. An old house adjacent to the building has been turned into a nurses' home. The laboratories occupy a three-storey block adjacent to the ward block, so that urgent work can be carried out day or night. On the ground floor are three main laboratories: routine bacteriological, histological, and biochemical, while on the first floor are research and sterilising rooms, the incubation room, the library, and a still room fitted with a double door to keep it as free as possible from dust. Another £3000 a year is needed to supply a full staff, but a start has been made by the Director, Dr. Leonard Colebrook, assisted by Dr. Ronald Hare. It is hoped to make a complete bacteriological survey of puerperal fever and to investigate the biochemistry of the toxæmias. Dr. Colebrook hopes to find out whether or not a limited number only of strains of streptococci are dangerous to parturient women and, if so, how to differentiate the ones that matter; also whether it is possible to protect the patient by vaccine, serum, or some drug such as metarsenobillon, with which encouraging results have been obtained. The unit certainly has excellent conditions for its important work.

A POST-GRADUATE COURSE

MOTIVES AND MECHANISMS OF THE MIND.*

XII.—PSYCHOPATHOLOGY IN RELATION TO TREATMENT.

THE purpose of this final lecture is twofold, being firstly, to attempt some analysis of the relationship between doctor and patient, and secondly, briefly to discuss the different methods which may be employed in psychological medicine, both being considered mainly from the point of view of psychopathology. In previous lectures we have only dealt in broad generalisations, and perhaps it is particularly necessary to warn the reader of the inevitable limitations of this present attempt at analysis of a most difficult problem. However, in spite of the magnitude of the task, it is still necessary and valuable to attempt to trace the trends of unconscious motive, both in patient and physician.

WHAT THE DOCTOR WANTS TO BE.

It will be generally admitted that the rôle of the physician is a very difficult one, and we may therefore anticipate that the unconscious feeling towards it will tend to be one of *inferiority*. In other words, the doctor will feel that he needs all the help that he can obtain for the successful exercise of his profession, and we are by this time well aware that the unconscious has different methods of giving help to those who feel themselves to be in a position of relative inadequacy. We may perhaps surmise that the incarceration of many simple facts amidst long Latin names is due to a defence mechanism, since there is no doubt that we feel we know more about a thing when we have given it a name, especially if the name be a long one, possibly even more when the long name is a Latin one. Although it is only by scientific phraseology properly used that we can hope to understand one another, and the advantages of Latin are both historical and geographical, yet we may see here another example of how the unconscious motive may sometimes creep in where it is least suspected. Again, we need not criticise the behaviour itself, but it is always well to look for the hidden key of unconscious motive, before we can open the locked door of defensive rationalisation which tries to hide inadequacy.

In the uncertainty of our profession we need to feel both sure and safe, and it is towards these goals that we may expect our defence mechanisms sometimes to operate, creeping in unconsciously in certain instances to safeguard us from our own uncertainty. But if we agree to recognise the existence of such a protective tendency, we need not think for a moment that such mechanisms constitute the whole of our behaviour. Surely medicine, as both art and science, can stand above such needs, seeking and facing the truth simply and with courage, even if it is sometimes necessary to modify it for the greater comfort of our patients. We only need to find and face the facts; but amongst them we must not be too shocked if we find defence mechanisms, sometimes even in ourselves.

Perhaps the best way of feeling sure is the assumption of the already familiar rôle of *omnipotence*, which some of us are inclined to do. This is made more easy owing to the fact, as will be mentioned later, that the patient is anxious to thrust omnipotence and magic power upon us. Another form of over-compensation is the *heroic method*, in which case we may usually look for the heroism in the patient rather than in the doctor. It is quite certain that the heroic method would only be adopted when the physician felt himself to be in a position of relative inadequacy, and it is therefore a method which is liable to be influenced by the mechanism of over-compensation. Then there is the tendency to adopt *panaceas*, with all the would-be assurance that one really knows what one is doing, usually with the support of pseudo-scientific rationalisations. We believe in our panacea as long as we can, or until another one has come to take its place, and they are very useful to us in overcoming feelings of doubt and therapeutic impotence. But if all such methods are useful to the doctor, they are the absolute need of quackery, which, through ignorance of the practice of scientific methods, requires every help that omnipotence, heroism, and panaceas can afford in the extremely difficult task of successful therapeutics.

It is not to be wondered at, perhaps, that we should be afraid of our responsibility as practitioners and should therefore play for safety. Defence mechanisms towards this end will tend to define and limit our responsibility and interest to the greatest possible extent. This we may do by focusing our vision on the foreground of the *symptom*, rather than the much vaguer and more difficult horizon of the patient as a whole. This same tendency will lead us towards an attitude of *materialism*, because of its relative simplicity, which is fixed and finite compared with the uncertainties of less material or more psychological values. We should also expect the medical profession as a whole to be *conservative*, identifying itself with past prestige rather than accepting new ideas with all their added doubts and dangers. And finally, where the desire for omnipotence has been disappointed we shall expect to meet the *cynic*, who has protected himself against the failure of his phantasy by adopting an attitude that failure is inevitable and nothing is worth while.

WHAT THE PATIENT WANTS THE DOCTOR TO BE.

Father imago is a most important factor in the attitude of the patient towards the doctor and is primarily associated with the relationship of child towards father. The wish of the patient is that the physician should be benevolent, personal, ubiquitous, and omnipotent, possessed of a divine magic power to cure him of all his ills and to stand between him and all that he fears of evil, sickness, and death.

The patient's desire for magic is associated with a wish to have something for nothing, so that he does not have to do anything or know anything himself in order to be cured. The other side of this picture has already been mentioned in referring to the "rebel" motive, which is as willing to disparage the power of the physician, as its opposite is to exaggerate it to omnipotence. The patient with a rebel psychology may choose a doctor of the same type, who is to be found amongst the minority who are "again the government" and the advocates of all that is most new.

WHAT A DOCTOR SHOULD BE.

It is sometimes said that all general practitioners employ psychotherapy in the treatment of their patients, but it is difficult to understand the word

* A course of 12 lectures delivered under the auspices of the Tavistock Clinic, Tavistock-square, by Dr. E. Graham Howe during the autumn session of 1930. Earlier lectures of the series have appeared weekly in THE LANCET since Jan. 3rd.

being aptly applied to any treatment which does not involve a knowledge of the pathology of the disorder and the reason for the method which is used. To prescribe a remedy blindfold and without knowing why is dangerously akin to quackery and yet, if it is true that physicians are using psychotherapy, it cannot be said that they usually know in what way they are using it. If the psychological side of medicine is of any importance, *psychopathology must be the foundation upon which the technique of its employment must be based.*

Probably the most important psychological factor is the imago rôle in which, whether he wishes it or not, the doctor is invested with the power of magic and the privilege of mediator, and it is a matter of no small difficulty to decide to what extent the doctor is justified in pandering to his patient's psychological weaknesses, such as the desire for a coloured mixture or in fact for a medicine at all. It is not only a question of financial cost (the amount spent every year on unnecessary drugs being enormous), but it is also a matter of educating the patient's ideas towards the sounder basis of a less unconscious and a more truthful attitude towards the problems of his physical and mental health.

There are those, and they are many, for whom it is the doctor's duty to provide props to stay their instabilities, and for such as these a mixture of desirable colour and flavour would seem to be legitimate therapeutics, as long as it is employed wisely. But in his acceptance of the imago rôle, the physician must realise that besides his privilege of magician he also has the responsibility of *educator*, and this is very liable to be ignored in the easy satisfaction which may be derived from the former. In a previous lecture the right kind of father was described as one who was both coöperative and encouraging, humble rather than assuming omnipotence, not protective unless protection is required, and only very rarely punitive—and perhaps the same definition may be applied to the right kind of physician.

It is both interesting and important to consider the question, "Should a doctor attempt always to *cure* his patient, or may he sometimes rest content with *palliatives*?" because it raises a special problem in regard to psychological medicine. The removal of the symptom is all that treatment of psychological disorders by organic methods can ever hope to do, and it is at best a form of imago magic, at worst blind quackery. But what is the alternative? If we take the broader view of radical cure, we become involved in the responsibilities of being educators of character in the most unlimited fashion. We become guide, philosopher, and friend, as well as physician, and pilots of "the way" of life. Must the doctor then assume his ancient rôle of priest again, and be the spiritual guide as well as the magical medicine-man? To accept the responsibility of the one is to accept a great deal more than is at present included within the already overcrowded medical curriculum, and yet to confine his art within the limitations of the other is to place the physician dangerously near the blind self-satisfaction of the quack.

It is not necessary, probably, to add a word of warning as to the dangers of being a good physician, but we need to be aware of the added difficulties which we shall find if we choose to pursue the ideal of truth, whether it be in medicine or religion. It is the simple and the finite which will appeal to the patient and the rôle of the educator is by no means an easy one. The quack, with his assumption of omnipotence, is giving the patient what he wants, and the doctor with the bottle of medicine and electric spark is likely to have a larger practice than the scientist who sees more in illness than physical organs and material disease. In the same way, the preacher who presents his religion in terms of an anthropomorphic and benevolent Deity behaving in a way which is satisfactory to the wishes of his congregation, is more likely to fill his church than is the seeker after truth. But the problems of life frequently present themselves in those terms of the "birthright" and the "mess of potage." A good physician may content himself with the fact that he is building for the future, realising that in his rôle of educator to-morrow is sometimes more worth while than to-day.

Medical Treatment in Relation to Psychopathology.

It has probably been the experience of many physicians that the successes of their remedies depend to a large extent upon their own belief in them. In the early days of practice, when their enthusiasm and sense of a new power was unbounded, they were sometimes able to achieve results which later experience seemed to deny, owing to the fact that it had taught them the limit of their powers. If they failed to believe in them, their once faithful remedies might fail to cure.

There is much to suggest that there is more in medicine than the pharmacological properties of the drugs prescribed by the physician. A doctor's obvious belief in his own prescription is often of greater value than the drug prescribed. Although pharmacology is based on careful scientific tests, it still fails in many cases to account either for the successes or failures of certain drugs. There are some which have a definite and reliable pharmacological action, but there are many more, the effects of which are uncertain and the results of their prescription unreliable. The usual preference amongst patients for a coloured mixture is due to a very simple psychological attitude, which assumes that there is more virtue and strength in what is visible than in what is invisible. However much these simple psychological factors may be ignored, they are still of great importance in the success or failure of the administration of drugs which may otherwise be given merely according to scientific method and for their pharmacological properties.

For example, the examination of the pharmacological properties of *valerian* fails to show why it should have been used since ancient days in the treatment of hysteria, and yet its precedence in empirical therapeutics would tend to show that it may be employed in such cases with useful results. But perhaps there is more in valerian, as in a great many other drugs, than has ever got into the text-books of pharmacology. Recent work on the psychology of smell suggests that it may be through this means that valerian acts in hysteria, satisfying the desire or unconscious tension in a way that is not associated either with words, pharmacology, or behaviour. The smell of valerian is one of sexual potency and significance, although of a very primitive and unconscious character. It is therefore quite possible that valerian is therapeutically active in spite of its inertness from the point of view of pharmacology.

There are many other drugs which may owe their potency to similar unconscious factors, but it is necessary to consider from this point of view the whole subject of the administration of drugs, both orally and by injection. There is no doubt that the mouth is invested emotionally with a character and significance

of great importance, and it is probable that the taking of any medicine by mouth from the hands of the doctor assumes the importance of an *unconscious ritual*, which may therefore have a definite therapeutic activity quite independently of what the drug may be which is prescribed. Then with regard to injections, why is it that patients in general regard this method of administration with greater awe than if they are merely given medicine to swallow? And why is it that many strong men are liable to faint at the prick of a hypodermic needle? Again, it may be that we are dealing with factors of unconscious significance, the importance of which we are not at present able to estimate or to define.

The field in which this psychological research needs to be employed is a very wide one indeed, but it is perhaps especially important in electro- and balneotherapy. The latter is particularly interesting in this connexion, and it would appear possible that as a therapeutic method it is deserving of far more general application than it has yet received, especially in cases of mental disorder. Reference has previously been made to the primitive emotional importance of water, which so often enters dreams with a mystic and liberating significance. It is well known that men are liable to sing in their bath, and Archimedes is not the only one whose mind has been more open to make a great discovery during this intimate but common-place operation. If it were possible to do so, a great deal of psychotherapy might be done more simply and rapidly, if it could be carried out with the patient under the liberating influence of a hot bath! Balneotherapy, with whatever scientific or artistic adjuncts it may be employed, has certainly much unconscious psychological significance.

We must at times have anticipated a reasonable certainty of cure in a large number of our patients, and of failure in a smaller proportion. It is as if any of us, with our different methods, can be successful with something like 75 per cent., and that in those cases the particular method adopted is relatively unimportant, although *the presence of the doctor is itself of therapeutic value*. The personal factor or "bedside manner" is of importance, but may it not be the case that it is the *unconscious therapeutics of the imago relationship* which is of primary importance in those innumerable cases in which the pharmacological activity of the drug prescribed is not in itself specific for the cure of the disease, or unless it be a transient affection which cures itself?

The great danger of the present system of medical therapeutics is that it is liable to "draw a red herring" of pseudo-scientific fallacy across the patient's attitude towards health and disease. There are many patients whose illness is unconsciously motivated, and for such as these it is most in accordance with their unconscious wish that they should find a doctor who will treat it as being organic and therefore beyond their control, completing the mutual deception by the prescription of a bottle of medicine. There are many others who resort to the surgeon and the gynæcologist in order that they may solve their unconscious emotional problems by the sacrificial ritual of oblation. Such patients are liable to return again and again, usually to different surgeons, carrying the scars which mark the triumph of the unconscious motive from one hospital and nursing home to another. Eventually, perhaps, they may fall into the hands of a psychotherapist, but by this time their case is like that of the patient on the hospital round who, having heard the opinion of all the students one after the other expressed against the need for an operation, followed by the surgeon's decisive and somewhat scornful statement to the contrary, said: "No, thanks; ten to one is good enough for me!"

Hygiene Propaganda.

However necessary the teaching of hygiene may be, there are many obstacles to be overcome before the general public can be educated to a better attitude towards problems of health and disease in mind and body. Progress will only be achieved in face of a wish to retain the easy attitude of irresponsibility which has been fostered in the past. It is so much easier to pay 9*d*. a week and claim medical services and a bottle of medicine, than it is to assume responsibility for the preservation of one's own health. Further, interest in hygiene, whether of mind or body, is liable to assume a morbid irrelevancy and to become a focus of self-centred hypochondriasis. It is not sufficient to teach the importance of alphabetic vitamins or the daily evacuation of the bowels, or even of the prevalence of rationalised defence mechanisms, because such isolated details tend to become matters of exaggerated importance, whilst all general principles are ignored. It is perhaps safe to assume that the first converts to hygiene would number amongst them many faddists and hypochondriacs.

To conclude this section, we may suggest that the problems of hygiene and the education of the general public in matters of physical health, would seem first of all to involve the conversion of doctors as a whole to a new attitude of mind based upon a knowledge of motive and the principles of psychopathology, rather than upon the more material foundations of anatomy, physiology, and pharmacology.

Psychotherapy.

Let us now turn from our general consideration of the rôle of the physician to the practice of psychotherapy.

Previous lectures have dealt almost entirely with the ætiology and psychopathology of mental disorders, because it was felt that this was the only way to establish psychological medicine on a reliable and reputable footing. But the physician must regard psychopathology as a means to the end of psychotherapy, and in the end he wants to know how his patient may be cured. Unfortunately it is often easier to understand than to remedy, and the physician who hopes to find a method of curing the weals and woes of the mind with anything as easy as a bottle of medicine and "rep. mist.," or the repetition of complexes and mechanisms, may be disappointed. Perhaps it is inevitable that the practice of psychotherapy should always fall short of the preaching of psychopathology, but it is probable that the next few years may see a great advance in our present methods of healing. This brief survey of the different methods of approach to the variety of individual problems is very inadequate, but it aims at being tentative, suggestive, and critical, rather than in any way complete or final.

It is perhaps hardly necessary to say that it is a mistake for the psychotherapist to think that he can afford to ignore the physical side of medicine. He cannot do so for two reasons: firstly, the mind is too intimately associated with the body for any symptom of mental or emotional disorder to be taken by itself without searching for a possible related physical factor; secondly, the patient requires reassurance on the physical side, and if a complete physical examination has not been made, he is able to keep at the back of his mind the feeling

that the doctor has missed the most essential point—namely, his body—which he would much prefer to be ill rather than his mind. This physical examination should, whenever possible, include a routine pathological examination of blood, urine, and fæces, and a search for all sources of possible toxæmia. After this has been done, both patient and doctor are more ready to settle down to the task of finding and removing the "unconscious" cause. It must also be borne in mind that even neurotics have organic ailments. It sometimes happens that as soon as the patient is labelled "nervous breakdown," "neurasthenia" or "neurotic," the physician omits to consider the possibility of a concurrent organic state which may, in itself, have an important bearing upon the symptoms. The only safe rule is to approach the patient in psychological medicine with the same rigorous physical examination as he would be given if he were a problem in organic medicine, without the label "functional" or "neurotic" to complicate the picture.

There are two distinct therapeutic attitudes towards problems of psychological medicine, which may be described as the *static* and the *dynamic*. The static attitude is content to label the disease and regard it as an act of God which may at some future date be subject to automatic alleviation. The dynamic attitude makes no such optimistic and inert-minded premise, but adopts the attitude "This person is ill. Why?" It is quite true that we may still be ignorant as to the causes of certain mental diseases, such as the manic-depressive type, but the cause will never be found until a great many physicians have repeated the question "Why?"

The first step in psychological medicine, as in organic, is *history-taking*, but it is a far longer and more painstaking matter. It may be safely regarded as never ending, and is in many cases the larger part of treatment. It is important to stress the necessity for *accuracy and detail of verbal description*. If we are examining a broken limb, we have the fracture before us and by visual and palpatory examination we can discern the limits of the disorder. In psychological medicine our eyes can tell us a great deal and nothing should be missed of attitude and gesture, but for the rest we are dependent upon words, which are the data and the facts upon which we have to base our diagnosis and our treatment. Viewed in this light, words frequently assume a new meaning and importance as, for example, one patient who said, "I have always viewed sex, at bottom, as a filthy thing"; another, "I sometimes almost feel tempted to believe that there may be something greater in life than reason"; and another, "Whenever I put a match to the fire it always goes out." In such ways, patients will often make statements, the meaning of which is far more apparent to the doctor who knows how to interpret them, than to themselves.

It is sometimes useful to ask a patient, "What do you think is the matter with you?" not in order to believe what he says, but as an indication of his line of thought about himself and his illness. It often happens, however, that a very useful clue may be discovered by this humble question. Whatever the patient's statement may be, the only safe interpolation of the psychotherapist is "Why?" in order further to illustrate the source of motive. Argument and persuasion should not enter into history-taking.

Psychological medicine is full of theories, but it is safe to say that each individual case should be opened as a new book, more important than all the rest. It is never safe to assume that a mechanism or complex which has been discovered in another patient means the same in a new one. Each case should be, as far as possible, examined and treated independently of all the others. In this way we may hope to avoid trying to persuade the patient of something which may have been true of someone else, but is not true of him.

History-taking is of itself a beneficial therapeutic method, because of the *catharsis* which it affords. "Confession is good for the soul," and in the process of a painstaking history the physician will find that he has got much information for himself and probably much relief for his patient who has found both a sympathetic listener and an imago mediator.

PERSUASION.

There are many cases in which the therapeutic method must inevitably be limited, to a greater or lesser extent, to some kind of persuasion. This method is particularly suitable where time is limited or the patient has not sufficient intelligence to undergo the analytic or interpretative methods. It is almost invariably unwise to attempt analysis or deep investigation of the past in the case of depressed patients over the age of 50, and for these the method of persuasion and repeated reassurance is usually all that can be done.

There are certain dangers in the persuasive method, in that the doctor may be tempted to give advice which it is not to the advantage of the patient to accept. For example, it is by no means unknown for a doctor to advise his female married patients not to have any more children, because their mental attitude at the first pregnancy gave cause for some anxiety. The patient is probably herself seeking for some such deterrent advice and can make a great deal of neurotic capital out of it for the rest of her life, as a source of self-pity and self-excuse. Probably the worst kind of advice adopted by the persuasive method is that which has been given in the past with greater frequency than is the case at the present time—namely, that all a man's troubles will pass away as soon as he has "had a woman," or that all a female neurotic requires is to get married. Perhaps these are the very physicians who complain that psychopathology is solely obsessed with sex! It should be quite obvious that if the disability is a sexual one, the cause will not be advantageously affected by resorting either to prostitutes or marriage. The result of such advice, if carried out by the patient, is usually disastrous, as it merely tends to throw into relief the anxieties from which the patient was previously suffering. The doctor cannot expect to be able to convey to his patient either the principles of a healthy attitude towards the sexual problem or even the elements of good common sense, unless he both knows something of psychopathology and has overcome false prejudices of his own. However it is done, the general teaching of the common sense of sex hygiene requires to be undertaken from the psychological point of view rather than either the physical or "moral," so that we may first understand the motives and mechanisms of such faults and failures as the patient may display, without superiority or prejudice.

Under the heading of persuasion we may also consider advice as to the change of environment. This is a ready method which appeals, at any rate by its simplicity, both to doctor and relatives, but it is far from being always effective. There are cases in which environment has been a causative factor, and in these it may certainly be advantageous to change it for something less difficult, but to resort to a change of environment in all cases of mental

disorder, is completely to fail to realise the innumerable ætiological factors which require consideration before any line of treatment should be embarked upon.

SUGGESTION AND HYPNOTISM.

Suggestion has been defined by McDougall as "a process of communication resulting in the acceptance with conviction of the communicated proposition in the absence of adequate logical ground for its acceptance." It is applicable in many cases in which suggestibility is the main factor in the ætiology of the patient's disorder, where we can thus hope to decondition an undesirable reflex and recondition a new one to take its place.

Successful suggestion therapy would seem to demand a certain temperament and personality on the part of the practitioner, and not by any means all of us are suited to carry it out, but it is very successful in certain cases. It is in hysteria that we are most accustomed to find hyper-suggestibility, but it must be made quite plain that although suggestion may cure the symptom it is not going to cure the hysteria itself. It is a comparatively easy matter to "cure" the hysteric suffering from amnesia, aphonia, or contracture of the foot, either by persuasion or suggestion, especially with the aid of spectacular electrical apparatus, but there is no doubt that after this has been done the patient's adjustment to life has not been fundamentally improved unless other steps have been taken to do so.

From the patient's point of view, the great danger of suggestion is that it appeals to their desire for a cure by effortless magic and the "button-pushing" method. If our desire is to help our patients to grow up, the consequence of suggestion is to keep them in the completely dependent attitude of children seeking for help from an omnipotent father.

Hypnotism is an extension of the suggestion method and may be carried out either by a "light" or "deep" technique. Most practitioners are content with the former and find that their successes by this method are as good as when deep hypnosis is attempted. Deep hypnosis is liable to increase the patient's tendency towards dissociation, but in light hypnosis the practice is not carried beyond the stage of increased suggestibility, and the deeper phenomena of dissociation do not take place. There are many varieties of technique, but in general the patient is encouraged to relax, with the aid either of tiring the eyes by focusing them on a point held close to and slightly above the line of vision, or by the repeated monotonous ticking of a metronome, and whilst in this state the therapeutic suggestion is repeated on different occasions.

THE ANALYTIC METHOD.

It is unfortunate, as it is liable to be very confusing, that there should be all the difference that there is between the general idea of the analytic method and the absolutely specific technique of the psycho-analytic school. The analytic approach to mental disorders is the ætiological pursuit of causative factors into the past, the childish and the primitive. Any such approach to the problems of the human mind must necessarily be analytic, but it is nevertheless not to be confused with psycho-analysis. Psycho-analysis means "Freud" and assumes both a specific psychopathology and a definite therapeutic technique. The latter, although invaluable for research work, can never be suitable for 99 per cent. of patients who require treatment, because of the time and cost which such treatment involves. The psycho-analyst operates only in an obstetric capacity and, taking no responsibility for the offspring, leaves all the work to be done by the patient without any interference on his part or attempt at persuasion. The patient lies upon a couch and, with the psycho-analyst usually somewhere invisible behind him, is told to report everything which comes into his mind, however irrelevant or undesirable it may seem to him to be, the first essential being that there must be no conscious reservation or alteration whatever. The psycho-analyst need not say anything during many such interviews (his presence acting as a "catalyst" for transference and imago reactions), and sometimes the patient's resistances may be such that the hour is spent in complete silence. This is repeated six days a week for months and even years, while the unconscious is gradually "worked off" through description, emotional abreaction and reassociation, with the minimum of interference or suggestion on the part of the psycho-analyst. The result is to develop an attitude of great reserve and self-control on the part of the psycho-analyst who needs to understand his method with extreme skill, which can only be the case if he has himself been completely analysed over a very long period by this method. It is quite obvious that neither the doctor nor the average patient can afford the time for this technique and, however desirable it may be, it must be put on one side for special cases and as a method of further research, while for the great majority we seek to develop the modified method which is more applicable to their needs. But this method must not be confused with psycho-analysis, which is a "trade-mark" for the specific technique already mentioned.

Whatever analytic method we may adopt there are certain common factors which demand consideration, the most important of which are *transference, resistance, and free association*. The relationship between the doctor and patient must be one of transference, in which, for the purpose of the treatment, the simple child-to-father relationship is used as the basis of the analytic technique. The patient will thus feel towards the doctor, and transfer to him, his imago feelings, and on this simplified battle-ground will be resolved the conflict of his unconscious. In doing so, it is inevitable that the patient's resistance will be aroused at some period to a greater or less extent, both the resistance which strives not to recognise consciously intolerable wishes, and the resistance which strives to retain unconscious wishes which have previously been gratified through the symbolical sources of his symptoms. The free association method traces back transferred affects to their primary causes and uses the material of symptoms, dreams, and everyday behaviour to discover the primary causative factors.

These modified analytic methods all involve a certain amount of *active interference* on the part of the doctor, who uses interpretation and re-education in his attempt to readjust his patient's life, by directing his thoughts along certain lines and suggesting causative factors and remedial measures. But such analysis must nearly always be more than a matter of "complex hunting," which seeks, by the rediscovery of repressed memories, to achieve the magical solution of the patient's problems. This simplest of all analytic methods may be found to work in a miraculous fashion in a very small percentage of cases, where there has been some traumatic experience which has been repressed from consciousness to become later causative of emotional disorder, but in the great majority of cases we are dealing with a *primary mal-adjustment to life through the misdirection of our patient's motives.*

A combination of hypnotism and analysis may be employed in some cases where the time factor is important and the repressed material difficult to arrive at by any other means. It is, however, a special technique which requires careful handling and it has the disadvantage of not keeping the patient in control of his own cure.

The pure psycho-analyst abhors the rôle of teacher, and by doing so cuts himself off from what has always been the primary source of the educator's achievement. But it would seem both desirable and inevitable that our analytic technique should be in continuity with the rôle of the teacher who works by explanation, interpretation, and re-education, although at the same time we need to recognise the importance of the phenomena of transference and resistance. There is no doubt that this teaching method can be of the greatest benefit in the great majority of cases, as long as the teacher has been trained to recognise the opportunities and limitations of his task. Do we doubt the power of words to build or to destroy, to hurt or heal, to comfort or annoy? There may perhaps one day be developed an art (or even science) of verbal surgery to cut and join with knife-like precision, but it will in no way resemble the bludgeonings of importunate argument and persuasion. It will be skilled, subtle, indirect, and interpretative, and may even have its own parallel technique of verbal anæsthesia. But our knowledge of psychopathology is at present much more highly developed and assured than our ability to use it in a satisfactory technique of treatment.

It has already been said that an unknown fear is more causative of anxiety to a patient, than one the source of which is recognised. Therefore, to interpret his fear to a patient, to help him to recognise the cause of it, is to define and limit it and give him power to control it.

For example, a patient was driving a car home after dark along an unfamiliar road, and having taken the wrong turning found himself going along a lane which finally ended in a ploughed field, far from the security of human habitation. All he needed to do was to turn the car round and return to the main road, but instead he felt himself overcome by an uncontrollable panic. All he wanted to do was to leave his car in the field, whilst he took to his heels and ran he knew not whither. But what was the cause of his panic? From whence came this transferred affect and what did it mean? Knowing his history it was quite easy to understand his feelings and behaviour because, quite apart from this misadventure, he had the psychology of the lost child who had been deprived at an early age of the feeling of security associated with his mother. Up to the age of 10, she had meant everything to him, but quite suddenly she had developed a psychosis and had been taken from him, and yet been kept isolated in the house in the care of special nurses, to be seen occasionally walking in the corridors, but never again to be a source of comfort to him. From that time he was liable to develop these panics in which he felt like a lost child, anxious to flee, but without a goal or any sense of security because he could not flee to the only comfort that he knew. His panic was interpreted to him in this way, and his fear assumed a finite simplicity which could be understood and reckoned with, and whenever it recurred it was reassociated with the desire for his mother and he was thus enabled to make a conscious readjustment to the demands of life.

It is sometimes quite remarkable the way in which such suggested interpretation will have an almost instantaneous effect in the removal of symptoms.

A patient, aged 35, who had been in the habit of having attacks of enuresis whilst shaving in the morning, never had them again at this time after he was asked to consider the significance of shaving in relation to manhood, although they afterwards occurred at other times of the day.

For a year a man of 40 complained of pain in the foot which had resisted all his physician's attempts at alleviation, until it was reassociated with its cause in a very violent quarrel with his wife, who "hurt his feelings" by slamming the bedroom door against his stockinged toe, keeping him for the night on the wrong side of it.

It is like playing "noughts and crosses," sometimes the patient getting as far as OO when the analyst's interpretation puts the X against that particular symptom, and the patient then starts off OO again on another line, to be checked as before, until the motive disappears.

All symptoms may thus be made the material of explanation, interpretation, and re-education. Dreams were described by Freud as the *via regia* to the unconscious, but it would seem an unnecessary limitation and an exaggeration of the importance of dreams as such, to suggest that they were all-important in a patient's analysis. His whole behaviour, symptomatic and everyday, may be motivated from the same unconscious feeling sources, and his political or religious opinions, gestures, mannerisms, and daily habits may all be used as analytic material.

When are we to regard the patient as being cured? Is "cure" something which is necessarily final or complete, or is it something relative and only partial? Our answers to these questions must depend upon the answer which we choose to give to the question which has been asked already—namely, whether we are trying to remove the patient's undesirable *symptoms*, or whether we are also trying to show him *the way to live*. It may be said that the latter is not the doctor's task, that it is the task of priest or philosopher, but not of physician. However, to attempt to cure the symptom is so often found to involve the whole problem of the patient's attitude towards life that it is not always possible thus to limit the rôle of the physician to the cure of symptoms. It must be added also that perhaps the doctor's task is made more difficult by the fact that priests and philosophers themselves may be amongst those most subject to and activated by unconscious motives. The physician is therefore wise who regards his task from the unlimited point of view and who is content to show the way, sending his patient forward on the adventure of life without any finality or completeness of achievement.

RESISTANCE.

It is not for nothing that consciousness is resistant to "such stuff as dreams are made on." Consciousness is the check upon impulse and is the seat of conscience and inhibition. Conflict and resistance between the two are automatic and inevitable until such time as they have been resolved by analysis and adaptation. It is for this reason that psychological medicine will have many detractors amongst those who have developed a conscious (but yet unconsciously motivated) defence against their own unconscious motives and mechanisms. But the phenomena of resistance must inevitably occur in any analysis, and there will come times when the patient's attitude towards his treatment and his physician becomes definitely antagonistic. These will occur, either to prevent him from recognising unconscious wishes or, and more severely, when the gratification of those unconscious wishes is becoming threatened. Rationalisation will come to his aid, and he will say that the treatment is doing him more harm than good, that his doctor is incompetent, that he cannot afford further treatment, that he is too busy, and in fact his "need" to stop the treatment will be shown by the multiplicity of his excuses. He may then go to see another doctor, who is very liable to fall into the trap, because of his own unconscious resistance, and say: "Of course, I told you so. Psycho-analysis (*sic*) is all nonsense." If not the doctor, there are always relatives to be

found who will advise that treatment should be ended immediately. This must always be regarded as the main difficulty of psychological treatment, because if the patient does stop treatment at this point the probability is that his last condition will be worse than the first. Although it is important that a patient should be allowed full freedom of choice as to his doctor, changing him at any time if he feels so inclined, the phenomena of resistance must be borne in mind, and the new physician must be warned lest his too-ready assumption of superiority may have been due only to the unconscious defensive motives of the patient's flight from an intolerable threat of recovery.

THE DANGERS OF ANALYSIS.

Much has been said in many places of the dangers of analytic treatment, and it is necessary to be clear in our minds as to what these are. One has already been mentioned—namely, that of treatment being terminated at the critical moment by resistance. In general, however, it may be said that much of the fear of analytic treatment is due to prejudice and a defensive attitude towards the unknown and the unconscious within ourselves. But that there are dangers in analysis, especially in the hands of those who are not trained in its technique, there can be no reasonable doubt. Analysis is an operation on the mind and demands as much knowledge of anatomy and operative technique as organic surgery. The dangers of analytic treatment may be discussed under three headings: (1) liberation of the unconscious; (2) removal of props; (3) disillusion.

Liberation of the unconscious.—In psychotherapy we are not only dealing with the finite limits of individual experience, but also with infinite sources beyond the individual's knowledge or control. The unconscious is possessed of powers and feelings of extreme potency, and it is a wise provision on the part of Nature to place inhibitions and an inexorable frustrating conscience to keep these powers within limits. But these inhibitions are not always wisely used, and analysis must seek to set them free and at the same time to direct them towards the desirable goal. Because it is playing with fire, there is no need to be unduly afraid of conflagration, but merely to bear in mind that it is sometimes easier to light the fire than to put it out. On the whole, it is remarkable that analytic operations can be carried out with such a minimum of danger, but they should be reserved for skilled hands and reasonably stable minds.

Removal of props.—When we understand that the purpose of the mechanisms which have been discussed in previous lectures is a defensive one, it helps us to realise that *there may be some danger in the removal of a patient's defences of which he may be badly in need.* Analysis is sometimes inclined to try to remove protections without first putting anything in their place, and of this an example may be quoted in illustration.

CASE EE.—Naval commander (retired), age 38. Married, three children.

Complained of: Syphilophobia; depression.

History: He had been "axed" out of the navy after the war. As a young man there was the usual history of dependence upon his mother, which was latterly transferred to the discipline and authority of the navy. He had always felt an exaggerated sense of guilt and inferiority, and when he left the navy the only support which he could find was in a very loving wife to whom he looked for protection and encouragement.

His syphilophobia was associated with great anxiety and depression and was largely an exaggeration of a lifelong guilt sense. As a foundation for it there had been in fact an earlier gonococcal infection.

This was the patient who had the dream of the donkey with the spiral and vine-like legs. His analytic treatment proceeded slowly, being directed towards getting him to stand upon his own legs instead of relying upon external authorities. But instead he developed ideas that he had committed the unpardonable sin and was abandoned by God, which alternated at one time with an incipient delusion that he was Christ. As soon as such evidence of instability showed itself, the treatment was directed towards reassurance, but unsuccessfully. Symptoms developed of acute agitated melancholia, with loss of weight of several stone in as many weeks. He became actually so ill that he required to be transferred to another institution, where he finally recovered.

It is impossible to say to what extent the treatment of his syphilophobia was responsible for his collapsing into a state of agitated melancholia. It is possible he might have done so in any case, but reviewed after the event his seemed to be a case which required further props, rather than the removal of those which he had already unconsciously acquired.

Disillusion.—Analysis in its search for the truth pursues the illusions of phantasy as the enemy, but it is very doubtful whether we can all afford to live without some measure of phantasy. There may be circumstances in which reality is too "stern" and truth "too true." The mother who has lost her child may need all the comfort that harmless phantasy can offer her to satisfy her frustrated wish-fulfilment. Domestic depressions and social hardships may leave the elderly charlady with a narrow margin of heaven, which requires compensation in the euphoria either of alcohol or of religious phantasy. There are perhaps many cases in which phantasy should be left alone, but this is a matter for decision in individual cases. Our pursuit of truth must not be too hard and inexorable, and we must be content sometimes to leave humanity the props which it may need.

The distinction between phantasy and the ideal has already been mentioned, and removal of phantasies should not take place unless practical ideals can be substituted instead of them. The danger of the psycho-analytic method would seem to be that much of the primary dynamism of life is robbed of its normal pursuit of the ideal, because the latter is maligned as "only compensatory phantasy." If analysis is provocative of disillusion, it must be regarded as a harmful treatment, but this need not be the case if our therapeutic technique is always directed towards self-expression in pursuit of the ideal and self-adjustment in harmony with reality.

THINGS WE WANT TO KNOW.

(*a*) *The primary energy of life.*—In psychological medicine we are in the same position as scientists with regard to electricity and ether; we do not know what it is that we are working with, and upon which we are basing our hypotheses. What is Life, the primary energy of motive and behaviour, health and disease? What is the neuro-dynamic circulation? Is it thalamo-cortical, and if so after what manner? We are waiting for a modern Harvey, who will perform an inestimable service both to psychologist and neurologist, although he will not have discovered even then the answer to the question, "What is Life?" Being overdue, we may hope that this discovery in elementary physiology and anatomy will not be long in coming. Meanwhile, we all need to keep humble because quite literally *we do not know what we are talking about.*

(*b*) *Mind and body: the meaning of "nerves."*—This question forms a part of the great problem of the relationship between mind and body. "My nerves are bad" says the patient who is *afraid,* and we all tacitly admit our confusion of principle by saying occasionally, "He or she is a very nervous subject," because perhaps the pulse-rate goes up to 100 in honour of the doctor's visit. The first is probably

a case of "neurosis"; but what are we to call the second—"nerves"? In order to give us words which we have not, and to define the meanings of the words which we have, we require a "great lexicographer" to help us to think our way out of a world of verbal confusion in which only prejudice can thrive.

(*c*) *Psychotherapy.*—The third great hiatus in our knowledge seems to refer to the practical therapeutic side of psychological medicine, which is by no means so far advanced as that which through research has developed a growing mass of organised and well-proved psychological data. But how to make use of it? To suggest that the ideal method of *treatment* is the same one that has been used so successfully for *research* (viz., psycho-analysis) seems to be hopeless in more ways than one, and too reminiscent of the autocratic sterility of other systems which have "had their day and ceased to be." How to teach that part of the mind which does not enter consciousness? Not by abuse, cajolery, punishment or persuasion—but how else? It would seem certain that for most of us an hour a day for three years as a therapeutic method is out of the question, especially if we have to pay for it. Perhaps there is the middle way, some combination of magic and verbal surgery, but this is one of the things we would like to know. Meanwhile psychotherapy must be regarded as to some extent experimental, and, lest we should ever expect it to become too easy, we had best admit that the problems of human life and behaviour may for many years to come only attain solution after the manner of a great adventure.

The Future of Psychological Medicine.

In conclusion, we may wonder what is likely to be the future of psychological medicine, and what its influence may be upon medicine in general and civilisation as a whole. It must surely be quite obvious that it has much to contribute and that, at present, its contribution is largely unrecognised. But it is not only a matter of medical therapeutics, it also involves the whole problem of the organisation of society. To mention three of the most important activities of life—religion, education and law—all come within the new perspective of the psychological horizon, and we may expect that many changes will take place as a result of the general dissemination of psychological principles.

It has been suggested in an earlier lecture that the organisation of civilisation is largely based upon unconscious motives and neurotic mechanisms, resulting in social and economic unrest and international strife. It is, however, particularly in the direction of sexual hygiene that the effects of psychological teaching may be expected to have the most beneficial results. So far we have gone on the principle that Nature can be left to take care of itself, but it should by now be obvious that this is not true. Morals may be even less trustworthy than original sin. Unconscious defence mechanisms make a poor basis for the organisation of society, especially when they become rationalised into prejudiced and conflicting systems.

With regard to general medicine, it would seem as if the scientific attitude which recognises anatomy, physiology, and pharmacology as the basis of our understanding of the human body must be enlarged also to include psychology. The psychological side of the administration of drugs is often of more importance than mere pharmacological considerations. It was suggested that valerian and balneotherapy may be taken as examples of unconscious correctives to emotional disorder which work primarily through psychological channels. But can we foresee the development of such "unconscious therapeutics" still further? It is interesting to consider the relationship of such a medical technique, which would present stimulations and correctives to the unconscious through symbols, the meaning and value of which were known to the physician but not to the patient, to those methods which have been known in the past as "white magic." We are introduced again to a world of "sorcery," with the great difference that one day we may know the science of our magic, even if its meaning is not perceived by the patient whom it cures.

By such means the doctor may hope to have powerful additions made to his therapeutic armament, but it is to be hoped that he may never forget his primary duty as educator of his patient's attitude towards problems of life and death, health and disease. We may not yet have so far progressed in our knowledge of psychology as to be able to add the subject of psychological medicine to the already overloaded medical curriculum, without imposing an additional burden upon the medical student and general practitioner. But perhaps the time will come when we shall be able, with the additional knowledge which it provides, to make a new synthesis of the ever-growing bulk of our knowledge, which will simplify the whole into a more unified system than has been known hitherto. It is probable that under such new conditions the rôle of the physician as the educator of his patients will be regarded more seriously than it is at present, as being the only way to achieve what must always be our first and simplest goal, the prevention which is better than cure.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE.

THE following appointments are notified:—Surg. Lt.-Comdrs. A. A. Pomfret to *Flora*, for R.N. Hospital, Cape of Good Hope; G. G. Newman to *Emerald*; and C. Williams (D.) to *Hood*.

Surg.-Lts. P. B. Jackson to *Ganges*, for R.N. Sick Quarters, Shotley; W. E. L. Brigham (D.) to *Victory*, for R.N. Barracks, Portsmouth; E. C. Johnson to *Douglas*; H. P. Williams to *Revenge*; A. R. Ewart to *Fisgard*; and E. E. Malone to *Warspite*.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. A. Dawson to be Asst. Dir. of Pathology, War Office.

Maj. J. D. Bowie, R.A.M.C., Res. of Off., relinquishes his appt. under Art. 507 (b), Royal Warrant for Pay and Promotion, and is granted the rank of Lt.-Col.

J. E. Moody is granted a temp. commn. in the rank of Lt.

ARMY DENTAL CORPS.

Capt. J. L. Garrard to be Maj.

ARMY RESERVE OF OFFICERS.

Surg.-Capt. P. J. Bodington, having attained the age-limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY.

Capt. J. D. W. McCracken (late Camerons) to be Lt. and relinquishes the rank of Capt.

Capt. C. N. Vaisey (late R.A.M.C.) to be Capt.

W. G. Ayres (late Cadet Q.M.S., Epsom Coll. Contgt., Jun. Div., O.T.C.) to be Lt.

ROYAL AIR FORCE.

Flight-Lts. C. Crowley, G. W. McAleer, and A. E. Vawser are granted permanent commissions in their rank.

INDIAN MEDICAL SERVICE.

Capt. V. S. R. Pandit to be Maj.

Lt. E. V. Claydon to be Capt.

SPECIAL ARTICLES

AN EXTENSIVE EPIDEMIC OF CATARRHAL JAUNDICE.

BY J. ALISON GLOVER, O.B.E., M.D. CAMB., M.R.C.P. LOND., D.P.H.,
A MEDICAL OFFICER OF THE MINISTRY OF HEALTH;
AND
JOYCE WILSON, M.R.C.S. ENG.

THE epidemic here described was investigated in the course of work carried out for the Committee of the Medical Research Council for investigation into epidemics in schools. The Committee, under the chairmanship of Sir George Newman, with the assistance of some 30 of the great public schools, began the systematic collection of information in January, 1930, and the present intention is to continue the inquiry for several years, and to issue a report on the work at the end of that period.

This epidemic of catarrhal jaundice is of interest for it appears to be one of the most extensive described in this country, whilst it is the first known to attack a large public school, and, moreover, it affords evidence strongly suggesting that the disease is spread by nasopharyngeal "droplet" infection. The publication of a preliminary note upon it therefore seemed justified.

Course of the Epidemic.

The epidemic occurred in a small country town of some 6000 inhabitants. Here are situated three boarding schools: one for boys, with seven houses and some 400 boys; the second, a preparatory school with 40 boarders and 10 day boys; and, thirdly, a large boarding school for girls, also on the house system, with 250 girls. The latter stands well away from the town on rising ground; the girls are housed in five modern separate houses and all sleep in cubicles. This school escaped entirely from the epidemic, with the exception of one mistress, who developed the disease just at the end of term, but both the boys' school and the preparatory boys' school were attacked, a quarter of their boys sickening in each case.

These three schools are participating in the school epidemic inquiry and send weekly reports of all cases of sickness, so that an accurate record of the spread of any infection is possible.

In addition there are in the town two secondary schools for girls, both mainly day schools, but both with a few boarders; there is also a kindergarten school and a number of elementary day schools. A few cases of jaundice occurred amongst the pupils of all these schools.

Previous to March, 1930, the town had been free of the disease for many years. The medical officer of health informed us that there had been, 17 years before, an epidemic at a village a mile and a half away, in which he had taken great interest. For this reason, and also because he and his partner have an extensive practice, he is sure that he could not have missed any epidemic prevalence had it occurred, although the disease is not notifiable.

The first cases, alike in town and school, seem to have occurred in March, but were regarded as ordinary sporadic cases of simple catarrhal jaundice. Two boys from one house (A) were admitted to the school sanatorium, the first on March 4th and the second on the 10th. A master in another house had jaundice on the 3rd. It is interesting to note that the brother of the first case, also a boy in the same house (A), had the disease in the Easter holidays. In the town, two cases in adults are known to have occurred on March 8th and 13th, there being no apparent connexion between the cases. The next two known cases in the town occurred on May 10th and 12th; in the last week in May six cases in children of various families were seen in the town by one doctor, whilst another doctor saw a family of four children, who all fell sick on the 26th. At the same time another family living opposite on the other side of the road is known to have been infected, but so mild was the disease that no doctor was consulted. In all, up to July 25th these two doctors had seen altogether some 30 cases in the town, whilst a third doctor estimated that he had seen about 100 cases (in the town), mostly children attending elementary schools. It seems probable that (in the town) the number of patients who did not consult a doctor were at least as numerous as those who did, and that the total number of cases in the town which occurred before the outbreak in the school may have been between 200 and 300. The disease was uniformly mild, adult patients constituting perhaps one-fifth of the total number.

Outbreak in the Boys' School in the Summer Term.

It has already been stated that two boys of one house (A) had jaundice in March, and that another boy from the same house had the disease in the Easter holidays. During the first half of the summer term the health of the whole school was exceptionally good. The first case occurred in the same house (A), one boy being admitted to the sanatorium on June 10th with jaundice. He showed no pyrexia, and was regarded as a case of simple catarrhal jaundice, being discharged on the 30th. Between the admission of the jaundice case on June 10th and July 3rd 11 cases of tonsillitis (8 from A House) were admitted to the sanatorium. One of these boys admitted with tonsillitis on the 3rd was discharged on the 7th, and readmitted on the 13th with well-marked jaundice. Six cases of chicken-pox occurred in another house, but this disease did not spread and apparently had no relation to the jaundice. The first fortnight of July was remarkably fine and hot, and there was hardly any sickness in the school, but on July 14th the epidemic began, 13 boys falling sick on the 14th, 13 on the 15th, and 9 on the 16th. In all, some 95 cases—an attack-rate of 24 per cent.—were reported in the big school.

The onset of epidemic catarrhal jaundice is generally with a mild pyrexia, and as the jaundice does not usually develop until the fifth or sixth day after the onset, it was almost inevitable that at the beginning of the epidemic in the school the diagnosis would not be immediately made, but that the patients should be admitted with various diagnoses such as tonsillitis and gastric influenza (owing to the large number of cases in which vomiting occurred). An almost identical attack-rate, 25 per cent., affected the boys in the preparatory school, the boys of which attend the school chapel on Sundays and use the school swimming bath.

The first case here developed on June 28th in a boy (E), the next case occurred on July 6th, the patient (M) sleeping in the next bed but one to the first. In all,

10 boarders out of 40 had the disease (in the preparatory school) as well as one day boy out of ten, and one resident master.

Clinical Features.

This mild catarrhal jaundice was first clearly distinguished from the much more severe disease, now known as Weil's disease or spirochætal jaundice, by Cockagne. An admirable account of its clinical symptoms and epidemiology is given in the recent report of the Ministry of Health* by Dr. Morgan and Dr. Brown, and so it seems unnecessary to describe at length the clinical type of cases in this epidemic, which closely resembled those described in Dr. Morgan's report, but the following summary of the clinical features of the cases seen in the boys' school may perhaps be convenient. The disease was uniformly mild. The period from infection to the initial pyrexia (or the true *incubation* period) seemed generally to be about three or four days, the icterus appearing some five or six days after the initial pyrexia, or eight to ten days after infection.† The attack was, as a rule, ushered in by a *pyrexia* lasting for three to five days, similar to that of a mild attack of influenza, often with a secondary peak about the third day. In some six cases in the school sanatorium the temperature reached 103°, but more usually it was about 101° on the first day. Perhaps in one-sixth of the cases the onset was accompanied by a slight *rigor*, but in most, malaise, *headache*, and anorexia were the first symptoms. In the earlier cases *tonsillitis* was the initial sign, but was not a common symptom in the later cases. *Nausea* was common, and *vomiting* occurred in probably half the cases. *Discomfort* (hardly amounting to pain) in the upper part of the abdomen was very common. *Constipation* was usual, but in two or three cases in the town diarrhœa occurred. Icterus, generally slight and of an orange tint, was first noticed about the fifth or sixth day. The conjunctivæ were generally noticeably yellow before the skin. The urine showed the bile-pigment well in most cases, but was not heavily loaded with it, and cleared rapidly. The duration of the jaundice varied from a few days to two or three weeks. The liver was in many cases sufficiently enlarged to be palpable, and in two or three cases the *gall-bladder* was palpable. The *spleen* was enlarged in one or two cases.

Rashes.—Cases of urticaria occurred in three boys occupying the same study, one case being six days before the other two, which occurred simultaneously. In one of the latter cases the patient developed jaundice. Rashes occurred in two or three other cases, one boy having a profuse rash resembling that of German measles.

* Report of Public Health and Medical Subjects, No. 42. H.M. Stationery Office, 1927.

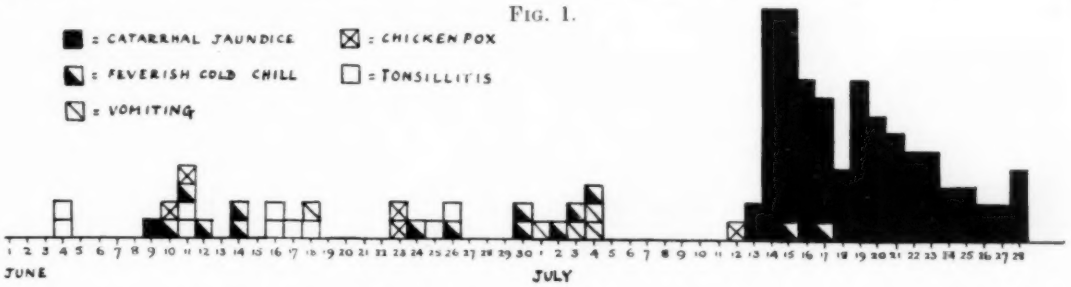
† One little girl who had been staying in the town developed icterus 20 days after leaving the town. There seemed in this case no likelihood of infection during the 20 days.

Transmission of Infection.

Largely, no doubt, because no considerable number of cases occurred in any large institution, Dr. Morgan in his report was unable to satisfy himself as to the mode of transmission of infection.‡ He says: "If the spread is by direct contact, what is the actual type of contact likely to be? It was assumed that the infection was conveyed by means of linen, clothing, or even the hands and other parts of the body, which were soiled by the excreta (the urine or the fæces) of the infective person." It is therefore one of the chief points of interest in the epidemic here described that it appears strongly to suggest that the method of transmission was by nasopharyngeal infection.

Fig. 1 shows the daily incidence of the cases. The sudden rise on July 14th suggests that infection was conveyed in one of three ways, either, that is, by (1) water, (2) milk, or (3) nasopharyngeal infection

FIG. 1.



Food transmission other than by milk may be considered unlikely, for boys of all the seven houses and of the preparatory school were affected, and all food other than milk is separately prepared in each house. As will be shown later, drinking water or milk transmission can be definitely excluded. Swimming-bath water transmission will also be considered later, and whilst it possibly may have been an accessory factor, it is unlikely to have had much importance.

The curve of incidence closely resembles that of influenza epidemics in this and other schools of similar type, both as shown in the diagram for the whole school, and in the individual houses, whilst the dormitory distribution is most suggestive of droplet infection alike in the big school and in the preparatory school. The familial distribution of cases already mentioned in the town also pointed to droplet infection, as did especially the circumstances in one hospital in-patient case, in which infection appeared to be associated with the operation of enucleation of the tonsils.

Transmission of infection either by the water or the milk-supply can be excluded with some certainty as will be seen from this Table.

School.	Water-supply.	Milk-supply.	Pupils attack-rate.
Boys.	Town-supply.	Pasteurised, from Mr. B of Z.	24 per cent.
Preparatory.	,, ,,	"Certified," from Major A of X.	25 per cent.
Girls.	,, ,,	Pasteurised, from Mr. B of Z.	Nil.*

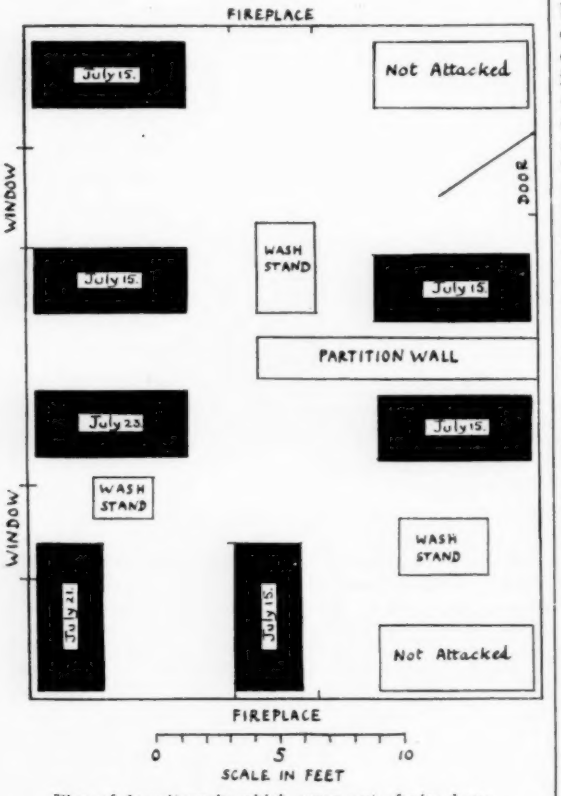
* 1 mistress ? infected in the town.

‡ Dr. Morgan, however, records an instance where four cases occurred in a large boarding school for girls at Newbury.

The boys' school is one in which the seven houses are widely separated. All meals are taken in the houses, and the boys meet boys of other houses in class, games, swimming bath, and chapel. Investigations made during three epidemics of influenza showed that there were wide differences in the attack-rates of various houses and a similar difference was seen in the present epidemic.

Fig. 2 shows the bed plan of one dormitory in which seven boys out of a total of nine were infected.

FIG. 2.



Plan of dormitory in which seven out of nine boys were attacked.

In another dormitory in the same house, five out of nine boys were infected, and there was in addition one doubtful case.

Transmission of infection by the school *swimming bath* was also investigated. The first fortnight in July preceding the outbreak was fine and hot, and many boys bathed. The bath is used both by the big school and by the boys of the preparatory, and it is not surprising that many boys gave a history of frequent swimming up to the time of onset.

The bath is a fine open-air one with a good concrete pool of perhaps 100,000 gallons. It is filled three or four times a term and is treated intermittently with Voxsan (a proprietary solution containing about 11 per cent. of free chlorine) under the directions of one of the science masters. There is no filtration or heating, but in the hot weather in the first part of July the water rose to 72°.

In such a pool with only intermittent chlorination and infrequent change of water, it is difficult altogether to exclude the possibility of the bath water being a vehicle of transmission, but it is doubtful if it was an important factor. A fair number of the boy patients had not used the bath for some time before onset, and the bath obviously had no relation to any of the numerous "town" cases. The pupils of the girls' school do not swim during term time.

The possibility of *rat-borne infection* was considered. Two of the houses which suffered most severely are old buildings, probably easily accessible to rats, but it was stated that rats had not been seen. Drinking water is said always to be taken from main taps, so that the possibility of tanks being infected by rats should not arise.

Two points were specially investigated, the first being whether mumps conferred any immunity to epidemic catarrhal jaundice, and the second whether enucleation of the tonsils had any influence upon the incidence of the disease. With regard to the former question which arose from the circumstances of one or two cases where it seemed a possibility and in view of the fact that jaundice is occasionally a complication of mumps, of 89 patients with jaundice in which the history of previous infectious diseases was clear, 37 (41 per cent.) had had mumps, and 52 (59 per cent.) had not. From this and from other circumstances which need not be detailed, it seemed improbable that mumps confers any immunity; and as 44 boys out of a total of 89 with jaundice were known to have had their tonsils removed, it is obvious that the question of enucleation had not diminished the incidence to any significant extent.

Another point of interest is that on July 24th a party of 57 Country Holiday Fund children arrived from London for a fortnight's holiday in selected houses in the town; they left on August 7th, being followed the same day by another party of 60 children, also from London, who left on the 21st. The medical officers of health of the districts from which these children came were informed, but in no instance are any of these 117 London children known to have developed the disease.

Cases in the town ceased about the middle of August, the last cases resembling those with which the epidemic began. In these the patients did not develop icterus. No case occurred in the schools during the Christmas term.

Dr. F. Griffith kindly examined bacteriologically swabs from the throats of ten boys in the earlier stages of the disease, and the urine of two patients with pronounced icterus, but nothing significant was found.

Summary.

1. This epidemic of mild catarrhal jaundice began with sporadic cases, alike in school and town, in March, 1930. There was a definite epidemic prevalence in the town in the last two weeks of May, and the disease continued epidemic in the town throughout June and July, ending in the second week of August with a few atypical cases of tonsillitis. In the boys' school two boys and one master had the disease in the Lent term, and at least one boy in the Easter holidays. All these boys came from house A in which the first case of the summer term occurred on June 9th. In the last days of June there were 11 cases of tonsillitis admitted to the sanatorium, eight of which came from house A. These cases of tonsillitis were probably associated with the outbreak but this is not certain, although one at least of these boys subsequently developed jaundice. Then, after a fortnight with no obvious infection, there was a sharp outbreak beginning on July 13th, the attack-rate both in the school and in the preparatory school being about 25 per cent.

2. The type of the disease was mild and similar

to that of the epidemics of 1925 described by Dr. Morgan.

3. The incubation period is difficult to estimate, but it probably lasts some four days. The difficulty is increased by the fact that in some of the milder cases the preliminary pyrexial onset is either altogether absent, or unnoticed, and jaundice, which clearly develops from four to six days after the initial pyrexial onset, is the first symptom noticed. This may suggest that the incubation period is longer than it really is. In many instances, where longer incubation periods are arrived at, the possibility of the occurrence of missed cases or of symptomless infection of healthy carriers must be borne in mind.

4. Headache, anorexia, and malaise ("feeling like mud" as one of the boys described it) are the most constant symptoms, but pains in the upper abdomen and vomiting occur in more than half the cases. About one-sixth have a slight initial rigor. The liver is moderately enlarged, the gall-bladder in a small percentage is palpable. Constipation is usual, but diarrhœa may occur. No complications were observed. Patients are usually children or adolescents, but young adults make about 20 per cent. of the total.

5. The evidence in this epidemic appears strongly to suggest that transmission was usually by naso-pharyngeal "droplet" infection, and that it was favoured by intimate contact, especially in sleeping quarters.

6. That some cases were due to infection by swimming-bath water is possible. It is more likely that in the majority of these cases the initial pyrexia was noticed after and attributed to swimming.

7. The bacteriological examination of two specimens of urine and ten throat swabs by Dr. Griffith showed nothing abnormal.

NOTE.—Owing to the fact that the Committee of Investigation into Epidemics in Schools has given an undertaking that all reports shall be published in such a form that no school can be identified, it is not possible for us to mention their names when we gratefully acknowledge our indebtedness to the headmaster, school medical officers, and the practitioners in the town whose aid was invaluable in overcoming the difficulties of making an investigation in a great school just on the eve of its departure for the summer holiday and at the end of the school year.

MEDICINE AND THE LAW.

Solicitor Ejected from Coroner's Court.

THE ejectment of a solicitor from a coroner's court at Wembley last week is instructive. An inquest was being held upon the body of a man killed in a motor accident. A witness stated that he was sitting in the dickey seat of a car proceeding at between 15 and 20 miles an hour. He called out to the driver "mind the fence, Ben." The car crashed into the fence and turned over; the witness, his wife, and the driver were extricated from under the car. A solicitor, appearing presumably on behalf of the relatives of the deceased, asked the witness if the driver had had anything to drink at the Great Central Sports Pavilion from which the party had just come. The witness replied that he had had a glass of beer. The solicitor then began his next question, "If the driver was drunk"—when the coroner (Dr. Cohen) intervened. Asked by the coroner if he had any witnesses to call to prove the statement that the driver was drunk, the solicitor answered in the negative. The coroner thereupon declined to allow the question (which he described as most improper) to be put, and directed the solicitor to sit down. The solicitor refused and disputed the coroner's power to prevent him from asking questions. The coroner warned him that, if he did not sit down, he would be ordered to leave the court. After further protest and dispute of the coroner's powers, the solicitor was removed from the court. The coroner then adjourned the inquest in fairness to the family, to allow them to be represented by another advocate. He could not, he said, allow the suggestion that a man was drunk if there was no evidence to prove it.

There can be no doubt that the coroner has an absolute discretion in these matters. His court is a court of record and he can commit persons for contempt if the contempt is in the face of the court. No action lies against the judge of a court of record for an act done by him in his judicial capacity. No question arises under Section 6 of the Coroners Act of 1887 as to whether the incident amounts to "rejection of evidence, irregularity of proceedings, insufficiency of inquiry or otherwise" so as to make it desirable that another inquest be ordered by the High Court, for the Wembley inquest was adjourned and not concluded. As is well known, the coroner conducts his inquest in his own way. He himself calls the witnesses and examines them; if witnesses are afterwards asked questions by other persons, it is solely by his permission; he is justified in refusing if the questions are improper. The Wembley case was, like any other motoring accident, a case in which the sobriety of the driver might be a material element. The Road Traffic Act has recently made it pertinent in traffic cases to inquire not merely whether the driver was drunk but whether he was under the influence of drink to such an extent as to be incapable of having proper control of the vehicle. It is, however, contrary to the etiquette of advocacy as well as to the interests of justice to insinuate in the form of a question an allegation for which there is no foundation. In checking the advocate, and in asserting his own authority, the coroner was entirely right; in adjourning the inquest he was entirely wise. Coroners have, it may be added, a general power to exclude the public in general or any individual in particular from their courts. The authority usually cited for this power is the case of Garnett *v.* Ferrand, decided in 1827. Ferrand, a coroner for the county palatine of Lancaster, turned Garnett out of his court. Lord Tenterden, C.J., observed that Garnett seemed to have had neither any interest in the particular inquest nor any information to give as a witness; but this fact apparently made no difference to the coroner's discretionary power.

When the adjourned inquest was resumed on March 24th, Dr. Cohen cleared up the position by asking the witness the direct question: "Was the driver any the worse for drink?" The answer was in the negative. In addressing the jury, the coroner explained that he was now satisfied that at the previous hearing the solicitor had no intention to make his question the vehicle of an unfair suggestion; the wording of it had led to a misunderstanding.

"Nature Cure" Practitioner Criticised.

At a recent inquest at New Barnet a post-mortem examination showed that the deceased woman, aged 35, died of advanced tuberculosis of both lungs. Dr. O'Callaghan, giving this evidence, stated that she weighed only 5½ st., whereas the normal weight of a woman of her height would have been 9 st. The husband of the deceased explained that his wife had from time to time consulted doctors about her health. They had advised her to continue with the diet which she was taking for indigestion

consisting mainly of fruit, salads, nuts, and occasionally bread. In February she went from her home at Croydon to the house of a Mr. Dane at New Barnet, to take a course of "nature treatment" under his direction. She said she was happy there and felt better for the treatment; she did not wish to see a doctor. Mr. Dane gave evidence that he was a doctor of science with an American degree for which he had paid no fees. He said he at first suspected that the accused had arthritis; later he diagnosed anæmia for which he treated her. He never described himself as a doctor; he wanted to call in a fully qualified man because he doubted the cause of the illness and wished to avoid possible trouble later. Apparently Mr. and Mrs. Dane had left the deceased for a whole day without efficient help. The jury, in returning a verdict of "death from natural causes," thought that this was gross carelessness on the part of Mr. and Mrs. Dane, "considering the undertaking given by Mr. Dane and the fees paid him"; the foreman said they were of opinion that medical aid should have been called in several days earlier in view of the mistaken diagnosis. The coroner observed that he entirely agreed with the jury's rider; there had been great neglect of duty towards the deceased.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

BOVINE TUBERCULOSIS IN THE HEBRIDES.

FOR many years milk tuberculosis in the Hebrides has been a puzzle. It has been alleged, on what scientific foundation it would perhaps be difficult to say, that cattle of the "highland breed" are tubercle-free. But the cows in the Hebrides are not all "highland." It is certain that, up till now, no systematic examination of them for tuberculosis has ever been made. It is also beyond doubt that in the Island of Lewis the death-rate from this disease is very high as against the mainland of Ross; but how much of it is due to milk has only recently been investigated. The provisional results are given by Dr. Harley Williams, Medical Commissioner of the National Association for the Prevention of Tuberculosis, in a paper just published in the *Transactions* of the Tuberculosis Society of Scotland. Dr. Williams gives an account of the investigation initiated by the Scottish Board of Health into the infection of cows' milk in Lewis. Dr. Williams himself was for a time medical officer of health for the island and has a direct and intimate knowledge of the whole problem. He and Dr. Ralph Begbie took 252 samples of milk from the following areas of the Outer Hebrides: Stornoway, Lewis, Harris, Benbecula, North Uist, South Uist, and Barra. The greatest number were, of course, taken from Lewis, the largest island. The specimens, taken as far as possible as random samples, were examined for tubercle by Prof. Carl Browning, both by cultivation and inoculation of guinea-pigs. Dr. Williams records:—

> "In no case out of the 252 were tubercle bacilli found by either method. Through unavoidable causes, some delay occurred in the examination of the specimens at Glasgow, and controls of known positive samples of milk are being treated in the same way as the original specimens. The results of these investigations are not yet to hand and, for the present, we may presume that this inquiry has revealed that the milk of 252 cows, selected at random throughout the five islands of the Hebrides, was free from tubercle bacilli."

To those that know the housing and cattle-housing conditions of the Hebrides, this result is almost astounding. The full technical report will be an important document, whatever qualifications may have to be made.

THE PAVLOV FILM.

Last week Prof. George Robertson invited the members of the Edinburgh Medico-Chirurgical Society to see the Pavlov conditioned reflex film, which was exhibited in the new lecture hall of the Jordanburn Clinic. The film was shown on three consecutive evenings to good audiences of medical men and women. It will eventually become part of the equipment of every up-to-date medical school. As a fundamental lesson in psychiatry, it was peculiarly appropriate to show it first at Jordanburn. There is a special fund available for this type of demonstration at the clinic.

MATERNAL MORBIDITY.

At the annual meeting of the Edinburgh Royal Hospital and Dispensary for Women and Children and the Elsie Inglis Maternity Hospital, Mrs. J. C. Johnston, the chairman, referred to the investigation of maternal morbidity at the Elsie Inglis Hospital. In 1928, she said, they had 667 in-cases and 13 per cent. of morbidity. In 1929, when they had begun a certain amount of isolation, the percentage was 9·7 and, during last year, when 6718 swabs were examined, they had a total morbidity of 5·2 per cent. There was a good deal ahead of them still, but she thought that in another year's time they would have some results which would undoubtedly interest people working on parallel lines.

LARBERT COLONY FOR MENTAL DEFICIENCY.

The Larbert Colony for the permanent care of the feeble-minded is making progress. Lord Mar and Kellie, at the annual meeting of the Royal Scottish National Institution, said that the colony was estimated to cost £100,000. They had obtained from £30,000 to £40,000. Work on the buildings had been delayed, but when they were completed they would probably be opened free of debt. Dr. R. D. Clarkson, the medical superintendent, reported that, in this its seventieth year, the institution accommodated 560 mentally deficient children. He pointed out that all cases of deficiency were not hereditary, and the belief that they were was doing harm. Cases might arise from inflammation of the brain, sleepy sickness, or accident. In any case, the after-care in the colony secured a happy life for the children, who frequently derived satisfaction from the things they made and sold.

IRELAND.

(FROM OUR OWN CORRESPONDENT.)

THE NEED FOR CLEAN MILK.

FOLLOWING the remarks of the President of the Royal College of Physicians of Ireland (to which I referred last week) the subject of clean milk has attracted a good deal of attention in the daily press. The *Irish Times* has collected the opinions and photographs of many well-known practitioners in Dublin, all of whom support Dr. Moorhead's demand for legislation. This concentration of medical opinion on a much needed reform has no doubt its effect on public opinion and on the Government. That the latter, if dilatory, is not altogether negligent of its duty in this respect is shown by a letter from the Minister for Local Government and Public Health to Deputy Sir James Craig, M.D., who had written to him regarding the long delay in proceeding with the

Milk Bill. Mr. Mulcahy expresses his regret that measures, considered to be more urgent, had delayed dealing with the Milk Bill, and he concludes :—

"I shall do everything possible to have the milk legislation expedited, but you will, I hope, appreciate the difficulty of having it dealt with in the current session, and will understand that delay in its introduction is not due to failure to realise its importance, but to the demands made on our activities by the legislative programme as a whole."

The *Irish Times* asks, not irrelevantly, "Why, in a competition of urgency, the Drink Bill was preferred to the Milk Bill"?

THE "NATIONAL SWEEP."

At the time of closing the subscriptions to the "National Sweep" last week, a sum of money had been received which was calculated to produce a prize fund of about £1,100,000, and a grant to the participating hospitals of some £400,000. This will be about three times as much as came to the hospitals from the November Sweep. On that occasion, however, only six hospitals benefited, while 23 are to share in the present undertaking. They share in proportions varying from 1 per cent. to 8½ per cent. of the total. The hospitals concerned are :—

In Dublin: Jervis Street, Sir Patrick Dun's, Meath, House of Industry, Coombe, National Maternity, National Children's, Children's (Temple Street), St. Ultan's, St. Patrick's Infant, Dental, Linden Convalescent Home; in Cork: North Infirmary, South Infirmary, Fever Hospital, Erniviler Maternity, Dental; in Limerick: Barrington's, County Infirmary, Bedford Row Maternity; in Waterford, County Infirmary; in Dundalk: County Infirmary; in Ballyshannon: Shiel.

NEW APPOINTMENT.

Dr. Theobald W. T. Dillon has been appointed professor of materia medica and therapeutics in University College, Dublin (National University of Ireland), in room of the late Prof. Maurice R. J. Hayes.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

THE "HEALTH PASSPORT."

THE Society for Hygiene and similar organisations are at present discussing the introduction of a so-called health passport—i.e., a document in which facts concerning the health of the individual citizen would be recorded. The proposal is not a new one. As long ago as 1891 it was suggested that everyone's hygienic history should be kept at a central office so that information of importance for marriage, insurance, or legal purposes might be readily available, the usual particulars about birth, marriage, and death being supplemented by notes of the more important illnesses and accidents. Dr. Grotjahn, professor of social hygiene, says that in Berlin everyone receiving medical aid from the municipal advisory boards or dispensaries is registered, but the data are kept in different places without any advantage to the public health. Prof. Gottstein, formerly head of the Prussian Government Department, has pointed out that for soldiers and many categories of government officials, registration of diseases already exists. Valuable material is also preserved in the archives of the Krankenkassen (sick-clubs). Some hygienists want the documents to be kept at a central office, although this would require immense premises and a staff of thousands of officials, whereas others think they should be handed to the individuals concerned, even at the risk of their loss. The obligation to professional secrecy is also urged against the introduction of the health passport, but as medical men have to state the nature of the disease on the certificates given to members of Krankenkassen for sick-pay this secrecy has already broken down. The official organ of the Socialist party, *Vorwärts*, combats the proposal from the workers' point of view. It says that the institution of even voluntary passports would induce employers to engage only workmen who held such a document and reject those without it. On the other hand, the employee would abstain from consulting a doctor for fear he should enter the disease on the passport. The discussion is obviously only a theoretical one and will have no practical outcome owing to the trouble and the enormous cost involved.

SURGERY IN DIABETES.

Dr. Grote and Dr. Flesch, of Prof. C. v. Noorden's clinic in Frankfort, report in the *Centralblatt für Chirurgie* on the results of operations on diabetic patients since the introduction of insulin. They say that notwithstanding the great progress made it must never be forgotten that a diabetic patient reacts abnormally, and operation should therefore be performed only when essential. Beforehand a fruit and vegetable diet with limitation of fat must be prescribed, together with injections of insulin to avoid acidosis. Before anæsthesia a big dose of insulin is given, and immediately after the operation is over the patient should have carbohydrates in the form of fruit juice or alternatively a drip-enema with glucose. In urgent cases where operation must be performed in spite of acidosis and without preparation, an intravenous injection of lævulose, together with insulin, is desirable. The anæsthetic is of great importance because emotional shock is very bad for a diabetic patient. Pernocton is therefore injected as a preliminary.

WIRELESS CONSULTATIONS.

For ships without a doctor the German authorities have arranged that application for medical advice may be made by wireless. A medical man on duty in the State Hospital in Cuxhaven, near Hamburg, is instructed to answer inquiries. Messages from foreign ships in English, French, or Spanish are translated for him and his prescriptions are in turn translated in the appropriate language. These arrangements are certainly likely to be helpful.

PANTOCAINE.

Pantocaine is a new compound intended for local anæsthesia. According to a report of Dr. Kiess its advantage compared with novocain is that the duration of anæsthesia is much longer, up to five hours, even in a weaker than the usual novocain solution. For anæsthesia by infiltration a 0·5 per cent. solution was used and also in lumbar, sacral, and splanchnic anæsthesia. For anæsthesia by loss of nerve conduction a higher concentration, up to 5 per cent., was necessary. Sometimes headache and vomiting developed but without any serious consequences. Dr. Wiedehopf, of the Marburg University Clinic, points out too that pantocaine is longer efficacious and less toxic than novocain, that it has no irritating effect and that it has proved valuable in infiltration and lumbar anæsthesia. It is moreover less expensive than novocain.

ROYAL FREE HOSPITAL.—The annual report states that for the past four years there has been an annual deficit varying from £16,595 to £5457. It is estimated that the expenditure of the hospital, including the dental clinic, will approximate to £95,000 in 1931. Income may reasonably be anticipated amounting to £78,000. Last year there were 5398 in-patients and 44,311 out-patients.

CORRESPONDENCE

THE OUT-PATIENT QUEUE.

To the Editor of THE LANCET.

SIR,—I see that in your leading article of March 14th (p. 595) it is stated that the appointment system has been tried with success at the King George Hospital, Ilford. It is true that the article goes on to say that this particular scheme implies such restriction in numbers that it would not be practicable in a big town. Further comments on the system are, however, required beyond this; for example: (1) the out-patient department at the King George Hospital, Ilford, is a consultative one. It does not, therefore, attempt to deal with patients in the same way as do the large general hospitals. (2) The total number of patients dealt with by this consultative out-patient department through the current week was 49 and this appears to be an average number. There is, therefore, no comparison at all possible between the out-patient department at Ilford and the out-patient departments at other hospitals. It should be perfectly simple to arrange by an appointment system for 49 patients per week, but it would be quite a different matter to arrange by appointment for the many hundreds who attend the out-patient departments at other hospitals.

The term "success" applied to the appointment system in Ilford requires very considerable modification. If only 49 out-patients are seen per week, the arrangement of appointments for this number of patients would be very difficult to make a failure. It can hardly be held that with such attendances the system has been a success in Ilford as far as supplying the needs of the huge area which the King George Hospital is supposed to serve is concerned, and I note that already modifications are contemplated in the Dagenham area. If with a satisfactory almoner system out-patient departments are still unwieldy, it is obvious that a bigger staff is required. The new Local Government Act should assist in providing more out-patient departments which will coöperate with hospitals overburdened.

It has to be remembered that voluntary hospitals are still maintained by charitable subscriptions and any attempt to limit their activities will have an immediate effect on the support accorded to them. Certainly the adoption of the batch or ticket system as mentioned in your article would improve matters.

I am, Sir, yours faithfully,

A. H. G. BURTON,
March 19th, 1931. Medical Officer of Health, Ilford.

"INVERTED FRANK BREECH."

To the Editor of THE LANCET.

SIR,—On Wednesday night, March 18th, I attended a lady who had had three previous normal full-time labours, all vertex presentations. I had previously seen her on Feb. 2nd, when the position was left occipital anterior and the head could be easily pressed into the pelvis. Pains began about 7 P.M. on March 17th. At 9 P.M. I made an abdominal examination; the vertex was over the brim, free, and I thought the back was behind. Except for one hour during the night pains were very slight till 2 P.M. on the 18th, when the strength and frequency increased. Just before 3 P.M. I made a vaginal examination; the cervix was three fingers dilated, the head very high in the left occipital posterior position, and the membranes bulging: the brim was not contracted, and the head was of normal size. At 4.20 P.M. the membranes ruptured. At 9 P.M. the head was still free, and as the pains had now been strong for seven hours I decided to examine under anæsthesia to find the cause of the obstruction, and if necessary, turn. The head was not pressed against the cervix, which projected down into the vagina, the dilatation being about the same as before. On introducing my finger into the cervix I found both feet lying over the brim just to the right of the head. I displaced the head into the left iliac fossa, pulled on the right foot, and brought it down. It was somewhat difficult to move the head up into the fundus owing to the small amount of liquor. I tied the foot by means of a bandage to the foot of the bed. About 10.30 P.M. the foot began to descend and the patient was reanæsthetised; delivery of the child alive (a male, weight 8 lb. 10 oz.) was effected without much difficulty. Progress of both has been so far satisfactory.

On looking through my records I find I have seen seven cases of complex presentation before this one. These eight cases occur in a total of 603 abnormal midwifery cases treated by me, and this was the only one in which the vertex and both feet were over the brim—i.e., an "inverted frank breech." I take it that it is a distinctly uncommon presentation.

It is perhaps noteworthy that this patient in her first pregnancy had an external cephalic version done for breech presentation about a month before term. In each subsequent pregnancy there has been, as is common, a breech presentation in the earlier months which has rectified itself some time before full term. In this pregnancy the presentation was a breech on Dec. 19th, but it changed spontaneously to a vertex before Feb. 2nd. Was it originally, one wonders, a frank breech and is this a usual result when a frank breech turns or is turned? Or does the child, as a rule, curl up its legs and adopt the normal flexed position? I think the second alternative is the more probable, seeing that the "inverted frank breech" is so rarely encountered, and I have seen one case where a primigravida was X rayed at the thirty-sixth week after an attempt at external cephalic version had failed, and the film showed a frank breech. She came into hospital in due course and had a normal vertex labour—i.e., she underwent spontaneous cephalic version of a frank breech and did not have an "inverted frank breech."

I should appreciate the views of your readers on what happens when a frank breech is turned and what may be the explanation of an "inverted frank breech."

I am, Sir, yours faithfully,

Park-square, Leeds, March 21st, 1931. A. M. CLAYE.

DISSEMINATED SCLEROSIS.

To the Editor of THE LANCET.

SIR,—In the issue of the *British Medical Journal* for March 14th, the Halley-Stewart Trust set out their reasons for establishing, under the direction of Miss K. Chevassut, a new centre for the study of this disease. I am concerned only with that paragraph of the letter numbered 1, in which my name is mentioned. In her original paper in THE LANCET Miss Chevassut adequately acknowledged such help as I gave her. The Halley-Stewart Trustees, however, have mentioned my help to her in terms which might

well suggest that I have taken an active part in Miss Chevassut's work. I desire to state that there is no foundation whatever for such a suggestion. Such help and information as I have given to Miss Chevassut has been confined to microscopical methods and to the use of an appliance devised for my own work on various viruses. Miss Chevassut has not, in any real sense, been "trained" by me. I have simply given to her such help and advice, on matters within my own competence, as I have given to many others in similar circumstances. If any comparison is permissible, my association with Dr. Carmichael's work in this field has been closer and more regular; it was carried out in large part at the National Institute for Medical Research, where my own work is done, and later at the National Hospital, Queen-square, where I visited him at regular, prearranged times.

I have received many inquiries concerning Miss Chevassut's work, which reveal an inclination to associate my name with it. I trust that this disclaimer will make it clear that I am neither entitled to claim credit, nor prepared to accept responsibility in connexion with it.

I am, Sir, yours faithfully,

J. E. BARNARD.

National Institute for Medical Research,
March 20th, 1931.

LYSOL IN OBSTETRICS.

To the Editor of THE LANCET.

SIR,—In the report of an examination of Marshall's Lysol, appearing in your issue of March 14th (p. 590), no reference is made to the use of lysol in obstetrics, and I should like to direct attention to this omission because the reliability of lysol in obstetric use has recently been called in question, and is a most important issue. In your report it is stated that a dilution of 1 in 100 is recommended for the patient's body, but the dilution recommended by the manufacturer for vaginal douches on the cartons is 1 in 400, presumably because stronger solutions are not tolerated; and no figures are given in the analysis published in THE LANCET for the disinfectant action of lysol in this dilution. I expect shortly to publish the results of a test of a series of germicides including lysols, with a view to determining their suitability for the prophylaxis of streptococcal infections. The distinction made in your report between *Streptococcus pyogenes* and *Streptococcus hæmolyticus* appears to call for explanation, as in the ordinary language of bacteriology these names are interchangeable.

I am, Sir, yours faithfully,

LAWRENCE P. GARROD.

St. Bartholomew's Hospital, March 16th, 1931.

EFFECT OF UNSPLIT OILS ON DIGESTION.

To the Editor of THE LANCET.

SIR,—An annotation under the heading Olive Oil and Digestion in your issue of March 7th (p. 537) reviews certain results of recent investigations which may possibly help us to understand the effects of liquid paraffin. It has been found that the introduction of olive oil into the stomach or duodenum definitely inhibits both the secretion of gastric juice and the contractions of the stomach musculature. I pointed out recently in your columns[1] that the action of liquid paraffin cannot be only lubricant, and that it is attended by some very undesirable effects, including stagnation of the oil in the stomach and cæcum, and repetition. It would appear that the delay in the stomach falls into line with the effects observed by the investigators of the action of olive oil, unless of course there is a difference in this respect between the action of mineral oil and a liquid fat such as olive oil. This appears unlikely because the olive oil not having passed the ampulla is not yet chemically split.

It is also found that olive oil causes a large flow of bile from the gall-bladder which has a laxative effect (e.g., as in infants, to whom olive oil is frequently administered by parents and others for this purpose). Again comparing the action of liquid paraffin it seems probable that part of the laxative, and at times irritant, effect of liquid paraffin is due to a discharge of bile into the duodenum. In the absence of experimental evidence to the contrary, and considering the resemblance between the physical properties of olive oil and liquid paraffin, such an assumption seems logical. I am, Sir, yours faithfully,

L. J. GREEN.

High-road, South Tottenham, N., March 21st, 1931.

[1] THE LANCET, 1930, ii., 771.

A SIMPLE METHOD FOR BLOOD CULTURE.

To the Editor of THE LANCET.

SIR,—Dr. McCartney's excellent description in your issue of March 14th (p. 583) of the device for the collection of blood for culture must appeal to everyone who has met with the difficulties he refers to when samples have to be sent by post or messenger; but he seems to be unaware of the fact that the identical method adopted by him has been in daily use for a considerable number of years. The screw-capped and rubber-diaphragmed bottle illustrated was patented by me a long time ago (British Patent 187900/22), and a spun variety of the same safety-cap has, for about ten years, been exclusively used by a well-known firm in this country for bottling vaccines prepared by them.

I am, Sir, yours faithfully,

EDWARD BURNET.

Harley-street, W., March 20th, 1931.

PASTEURISATION OF MILK.

To the Editor of THE LANCET.

SIR,—With reference to the article by Dr. W. G. Savage, in your issue of March 7th, I would suggest that all the troubles on the technical side of pasteurisation which he mentions may be entirely overcome by pasteurising the milk in the glass delivery bottles. This process secures the proper exposure of every particle of milk to the required temperature. The bottles after half an hour's pasteurisation should then be cooled to about 40° F. If this process were followed the risk of contamination before delivery to consumers is also eliminated. The method would also provide a complete answer to Mr. W. S. Stevens, M.R.C.V.S. (who writes in the same issue), if he fears that any of the septic poisoning, referred to in his letter, was caused from pasteurised milk.

I am Sir, yours faithfully,

ARTHUR G. ENOCK, M.I.Mech.E.,
Consulting Dairy Engineer.

Dutch House, Raglan-gardens, Wembley Park,
March 16th, 1931.

PANEL AND CONTRACT PRACTICE

Change of Doctor on April 1st.

THE Minister of Health has informed insurance committees that the new procedure to be followed by insured persons who desire to change their doctors will come into operation on April 1st. Under the new regulation an insured person whose name is already included in the list of a doctor, and who has not removed either temporarily or permanently out of the district in which that doctor has undertaken to treat insured persons, may transfer to the list of another doctor (*a*) at any time, as at present, with the consent of both doctors, or (*b*) at the end of the quarter provided that he has given at least one month's notice to the insurance committee. No change has been made in the existing regulation other than that indicated under (*b*), and it is expressly provided that notices of desire to transfer given by insured persons before the date when the new regulation comes into operation shall be dealt with as heretofore. Any insured person who gives one month's notice to the insurance committee will send his medical card to the committee, who will return the card to him with a slip (part A1) affixed and stamped so as to indicate the date on which transfer may be made. Until transfer is completed the insured person should apply to his present doctor for any necessary treatment. Insured persons who are using the present form of medical card will not be in possession of the new instructions as to change of doctor, and a notice explaining these instructions will be issued with any copies of the present form of medical card sent to insured persons in the interval before cards in the new form are issued. The notice proposed to be issued runs as follows:—

Notice to Insured Persons: Change of Doctor.

After April 1st, 1931, if you wish to change your doctor, and if you are still living in the district in which your present doctor practises, you should proceed as follows: Either: (1) You may, as before, transfer at any time with the consent of your present doctor and of the new doctor; in that case you must take your medical card to be signed by both doctors and leave it with the doctor to whom you wish to transfer; Or: (2) You may transfer at the end of March, June, September, or December, in any year, if you have first given notice to the insurance committee not later than the last day of February, May, August, or November, as the case may be.

If you wish to give notice, you should send a letter to the committee expressing your desire to transfer, together with your medical card. It is not necessary to inform the committee of the reasons why you wish to transfer, or of the name of the new doctor you propose to select. The card will be returned to you with a slip attached indicating the date on which the transfer may be made. You may then apply to any other doctor for acceptance, and, if he accepts you, you should leave your medical card with him. You should continue to apply to your present doctor for any treatment which you may require before the date on which you are able to transfer. You must secure acceptance by the new doctor *not later than* the date stamped on the slip, or you will not be able to transfer until the following quarter and after you have again given a month's notice to the insurance committee.

If you have not chosen a doctor, or if you have removed temporarily or permanently from the district in which your present doctor practises, it is not necessary for you to write to the insurance committee. You may take your medical card to any insurance doctor you wish to choose. If you are not in possession of a medical card you should complete a form of application (Form Med. 50) to be obtained at the nearest post-office, and send it to the insurance committee.

Appliances for Insured Persons.

Under article 6 of the National Health Insurance medical benefit consolidated regulations of 1928, arrangement was made for the supply of certain appliances to insured patients other than the drugs and preparations included in the usual prescription. Part III (B) of the Drug Tariff issued by the Ministry of Health contains a list of these appliances with a table of the prices which panel chemists are entitled to charge for them. In this table appear various kinds of bandages, plasters, gauzes, hypodermic needles, splints, and standard dressings. Panel committees frequently receive inquiries from insurance practitioners whether this or that appliance may be ordered on the prescription. There is, for instance, at the present time considerable demand for medicated bandages in the treatment of indolent ulcers of the leg; these are not at present included in the drug tariff and must therefore be paid for by the patient. Panel committees take note of these inquiries, and when the demand is apparent they bring before the proper subcommittee a suggestion that the particular appliance should be added to the "special list of drugs and appliances excluded from those in respect of which a capitation rate is payable." If the subcommittee approves, a request is forwarded to the Insurance Acts Committee of the B.M.A., which in its turn approaches the Ministry stating that in its opinion such a specialty might with advantage be added to the special list. As soon as the article has been placed on the list the doctor may supply it to the patient direct, in which case he should render an account to the insurance committee on the panel prescription form, or he may order it from the chemist on a prescription form in the usual way.

At the instance of the Insurance Acts Committee liver extract for the treatment of pernicious anæmia has just been added to the special list of drugs.

Medical Men and Health Insurance Work.

In reply to a question addressed to him in the House of Commons last week, the Minister of Health, Mr. Greenwood, gave the total number of doctors undertaking national health insurance work, and the total amount paid to such doctors out of national health insurance funds for each year since 1912.

Number of Medical Practitioners undertaking National Health Insurance work in England and Wales during the years 1913–30.

1913 ..	12,674	1920 ..	11,620	1927 ..	14,952
1914 ..	12,868	1921 ..	12,216	1928 ..	15,269
1915 ..	12,675	1922 ..	12,531	1929 ..	15,563
1916 ..	12,321	1923 ..	12,862	1930 ..	15,750
1917 ..	11,984	1924 ..	13,211	At Jan. 1st,	
1918 ..	11,675	1925 ..	13,823	1931 ..	15,703
1919 ..	11,346	1926 ..	14,432		

Amounts paid from National Health Insurance Funds to Insurance Medical Practitioners in England and Wales during the years 1913–30.

	£		£		£
1913 ..	3,858,000	1919 ..	4,052,000	1925 ..	6,518,000
1914 ..	3,673,000	1920 ..	7,403,000	1926 ..	6,661,000
1915 ..	3,470,000	1921 ..	7,824,000	1927 ..	6,831,000
1916 ..	3,353,000	1922 ..	6,773,000	1928 ..	7,037,000
1917 ..	3,845,000	1923 ..	6,670,000	1929 ..	7,109,000
1918 ..	3,641,000	1924 ..	6,476,000	1930 ..	7,300,000

This gives £464 as the present average yield of a panel practice.

Pathological Services in London.

Hitherto laboratory services have only been obtainable by insured persons on payment of a private pathologist's ordinary fee or by going to a hospital. The London Panel Committee has now arranged with a group of pathologists to perform these services for insured persons or their dependants at an agreed reduced scale of fees. Responsibility for payment rests with the practitioner, who recovers

it from the insured person. It should not be forgotten that some laboratory services are provided free by the local sanitary authority. There are 18 pathologists in London who are coöperating and the fees vary from 2*s*. for a hæmoglobin estimation to 30*s*. for a blood-sugar tolerance curve. Wassermann tests of blood or cerebro-spinal fluid, done in a batch of not less than 30, are charged 4*s*. each.

OBITUARY

ARTHUR HOPEWELL-SMITH, M.R.C.S., L.D.S. Eng.

THE unexpected death of Prof. Hopewell-Smith, at the age of 65, removes one of the foremost exponents of dental histology. He was born in 1865 in Lincolnshire, and after taking his medical and dental qualifications was successively assistant demonstrator in histology to the Charing Cross Medical School, and lecturer in dental anatomy and pathology to the National Dental Hospital. Thence he migrated to the Royal Dental Hospital, where he joined the staff as dental surgeon and lecturer in dental anatomy. He held this post until 1915 when he was appointed to the chair of dental histology in the University of Pennsylvania where he worked for 15 years. Last year he retired and returned to this country.

Hopewell-Smith began the study of dental histology at an early stage in his career and quickly became an expert of acknowledged eminence. He published two books on the subject, and these were generally regarded as valuable contributions to the normal and morbid histology of the teeth. In addition he published many papers in dental journals both here and in America. Only last year he read one before the British Dental Association on the problem of the pathological absorption of teeth and bone, in which he took the view that this process is not due to the action of osteoclasts, while his last contribution was a paper on enamel, read on his behalf before the Odontological Section of the Royal Society of Medicine a few weeks ago. His published work covered a wide range and there were few aspects of dental anatomy and pathology to which he had not made some contribution. During his tenure of the chair at Pennsylvania he paid several visits to this country and the large audiences which always gathered to listen to him testified to the affection in which he was held by his many friends and admirers in this country.

WILLIAM AYTON GOSTLING, M.D. Lond.

Dr. W. A. Gostling, who died on March 12th, aged 75, retired some ten years ago after over 30 years' practice in Worthing. After his retirement he went to the village of Slinfold, between Arundel and Chichester, but last year returned to Worthing.

Entering University College, London, Gostling had an unusually brilliant career. He early distinguished himself by obtaining first-class honours in anatomy at the B.Sc. examination in 1880. He was Cluff prizeman in 1881, and took the Filliter exhibition in pathological anatomy in the following year. He won the Atchison scholarship in 1883, in which year he also became M.R.C.S. In 1884 he took the degree of M.B. and B.S., both with honours; in 1885 he proceeded to the M.D., and subsequently he was elected a Fellow of University College. For a time he practised at Diss in Norfolk, from whence he went to Worthing. There he served the local hospital in an honorary capacity for nearly a quarter of a century.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED MARCH 14TH, 1931.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox, 171 (last week 227); scarlet fever, 1502; diphtheria, 1003; enteric fever, 31; pneumonia, 2039 (last week, 2273); puerperal fever, 44; puerperal pyrexia, 117; cerebro-spinal fever, 59 (last week 73); acute poliomyelitis, 2; acute polio-encephalitis, 1; encephalitis lethargica, 12; continued fever, 1; dysentery, 17; ophthalmia neonatorum, 110. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on March 17th–18th was as follows: Small-pox, 192 under treatment, 2 under observation (last week 189 and 5 respectively); scarlet fever, 1352; diphtheria, 1803; enteric fever, 214; measles, 123; whooping-cough, 418; puerperal fever, 30 (plus 12 babies); encephalitis lethargica, 121; poliomyelitis, 2; "other diseases," 171. At St. Margaret's Hospital there were 11 babies (plus 7 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (1) from enteric fever, 84 (3) from measles, 6 (0) from scarlet fever, 48 (11) from whooping-cough, 34 (11) from diphtheria, 68 (19) from diarrhœa and enteritis under two years, and 417 (53) from influenza. The figures in parentheses are those for London itself.

Three deaths from meningococcal meningitis occurred in London, 1 under 1 year and 2 from 5 to 15 years. 26 fatal cases of measles were reported from Liverpool, 11 from Newcastle-on-Tyne, 7 from Birmingham, and 4 each from St. Helens and Cardiff. Liverpool reported 4 fatal cases of diphtheria, Tottenham 3. Deaths from influenza diminished again. The 364 fatal cases outside London are scattered over 90 great towns; 24 were reported from Bradford, 20 from Birmingham, 14 each from Bristol and Sheffield, and 10 each from Bath, Derby, and Burnley.

The number of stillbirths notified during the week was 323, corresponding to a rate of 47 per 1000 births), including 69 in London.

SOCIETY FOR CONSTRUCTIVE BIRTH CONTROL.—A dinner was held at the Ritz Hotel on March 17th to celebrate the tenth anniversary of the foundation by Mrs. Marie Stopes, D.Sc., of the Mothers' Clinic. The health of the guests was proposed by Dr. Mather Thomson, who emphasised the moral and intellectual force behind the movement, and was responded to by Mr. David Low, who pointed out that the question was not only social and moral but also political. "Mothers' Clinics for the World" was proposed by Sir Anthony Hope Hawkins, who changed the toast to "All Mothers and All Babies." He said that although the preventive side of the movement might at the moment be the most important, its ultimate object was not preventive but creative: not fewer mothers and fewer children, but fewer unfit mothers and fewer unhealthy children. It was a marvel that this object did not meet with universal acceptance. Prof. B. Malinowski, in seconding the toast, regretted that there were no contraceptive measures for the second childhood which he was rapidly approaching. The mother and the child, together with the institution of marriage, he said, were in great danger at the present time and the danger came from those who opposed birth control. "Constructive" was the key-word of this movement, which reconciled sex, love, sentiment, marriage, parenthood, and religion. Mrs. Henderson having responded, the secretary read messages from clinics in other countries, while Prof. Leuenbach, of Copenhagen, brought greetings from the World League for Sex Reform. Miss M. Royden proposed the health of "Our Pioneer Clinic." There were certain things in the movement, she said, for which any decent human being ought to stand. The first was its opposition to that strange desire of some people to direct the lives of others. It was still worse when these people enforced their wishes by that most disastrous of all methods—the withholding of knowledge. Another factor in it was the human side; she recalled her own midwifery experience when a woman had come into hospital for the ninth year in succession to have her ninth dead baby. Sir Arbuthnot Lane seconded the toast and said that he thought Marie Stopes deserved no pity for the number of her enemies because one's enemies were one's best advertisers. The Chairman, in reply, deplored her failure to make the world understand the meaning of the phrase "constructive birth control." They desired to control and not to prevent births, and their work was often concerned in enabling childless women to have babies.

PARLIAMENTARY INTELLIGENCE

NOTES ON CURRENT TOPICS.

MENTAL TREATMENT RULES.

IN the House of Commons on March 16th Mr. GREENWOOD (Minister of Health) moved:

"That the Mental Treatment Rules, 1930 (Statutory Rules and Orders, 1930, No. 1083), dated Dec. 30th, 1930, and made by the Board of Control, with the approval of the Lord Chancellor, under Subsection (1) of Section 338 of the Lunacy Act, 1890, as extended by Subsection (1) of Section 15 of the Mental Treatment Act, 1930, which were presented on Jan. 20th, 1931, be approved so far as they modify or adapt any of the provisions of the Lunacy Act, 1890."

He said that the Ministry had taken the opportunity to consolidate the existing provisions so far as possible. The Act required that in any modification of the existing law they should take the opportunity to consult the interests concerned as far as possible. They had, therefore, consulted with the local authorities, the medical profession, the Mental Hospitals' Association, and similar bodies. Since the discussion took place the rules were modified and published, and he thought it had been shown that a measure of agreement had been reached for no representation had been made against them.

SAFEGUARDING THE LIBERTY OF THE SUBJECT.

Dr. MORRIS-JONES said that when the Act was before the House there was very considerable perturbation in the minds of Members generally in regard to whether the liberty of the subject was being properly safeguarded. He thought that these Rules and Regulations were sufficient in regard to the particular matter. He had very considerable sympathy with medical officers in institutions, whether private or public, who would have to work under the Act. When he looked at the Schedules at the back of the Statutory Rules and Orders and noted their complexity and number and variety, he began to wonder how a medical man in charge of cases was going to have time to look after those cases at all. He was not sure whether this was not another tendency of the State to burden the medical profession with far more clerical work than they had facilities to carry out. He felt sure that there could be no suggestion that the liberty of the subject was being infringed under this Act. On the contrary, it was very sufficiently safeguarded. He had hoped that the Minister would have seen his way to simplify some of these regulations which were bound to be a very great burden on those who would have the very serious responsibility of looking after the mentally afflicted.

Sir DENNIS HERBERT said it was a great farce that the House should be supposed to retain in its hands control over the putting into force of these Rules if a great document like this was brought before them without any explanation from the Minister as to how these Rules modified existing enactments.

THE MINISTER EXPLAINS.

Mr. GREENWOOD, replying to questions, said that the provisions of the principal Act applied to the question of the liberty of the subject. As to the rates to be charged where the patients were rate-aided that was a matter for the discretion of the local authority. Where there were private patients the rate charged was fixed by agreement between the parties concerned. On the question of the property of patients some discretion had been granted. It was necessary to protect public funds and to make a charge on the patient. It was a very difficult matter of administration. It would depend on the form of the Order. He was circulating a statement to local authorities pointing out that patients ought not to be deprived of the whole of their resources, and drawing their attention to an alternative procedure.

Sir KINGSLEY WOOD: Is any notice to be given to the friends of the patient before the Order is made?

Mr. GREENWOOD said he thought that that was so. In regard to second offences the penalties were laid down in the principal Act and it was not possible to go beyond them. They would not exceed £100 and he imagined that the penalty for a first offence was not so high. As to recapture that was an application of a section of the principal Act and they could not go outside it.

Mr. McSHANE: Does that apply in temporary patients?

Mr. GREENWOOD: Yes. As to visitations that was the prescribed minimum although the Commissioners could go oftener if they chose.

Sir KINGSLEY WOOD: With regard to the general Rules of the Board, in the case of disagreement how is it to be settled?

Mr. GREENWOOD said he thought the authority of the Board of Control was decisive. It was quite true that the Schedules were elaborate, but medical officers were accustomed to dealing with these forms and he did not think they would find them confusing. He agreed that this was a very large document. They had taken the opportunity of consolidating the regulations.

Replying to Sir D. HERBERT, Mr. GREENWOOD said that Rule 32 (Mechanical Restraint) was a verbatim reproduction of Section 40 of the principal Act.

The motion was agreed to.

THE RULES PASS THE UPPER HOUSE.

In moving the approval of the Rules in the House of Lords on March 24th the Lord Chancellor said that they had been submitted in draft to a number of interests concerned, including the medical profession. As a result of consultations many useful suggestions had been made in matters of detail which had nearly all been adopted.

The Earl of ONSLOW said that the only real innovation was the application of existing provisions to temporary and voluntary patients. The motion was agreed to.

DOCTORS AND TELEPHONE FACILITIES.

On Thursday, March 19th, the House considered the Civil Service Estimates on Report.

Mr. MACPHERSON appealed to the Postmaster-General to take steps to increase the use of the telephone in this country. Great Britain occupied only the tenth place among the principal telephone using countries in Europe and America.

Major LLOYD GEORGE emphasised the same plea, and particularly with regard to the rural areas. He thought that the Post Office was working on the wrong principle in rural districts. It insisted that the demand should exist before the telephone was put in. That was putting the cart before the horse. At the present time rural areas had to guarantee at least eight subscribers before they could get the telephone installed and then the guarantee as to calls was far too high. It was a serious matter not to have proper telephone development in rural areas. It was not a concern of the Post Office only, but should also receive the attention of the Ministry of Health, because only those who had lived in country districts could realise what it meant to have a doctor six or seven miles away, even when the telephone was installed in one's house. But when, as sometimes happened, one had to go six miles to get a telephone, there might be serious results. Within his own personal knowledge there had been cases where illnesses had been seriously aggravated and sometimes death itself had occurred. There was ample evidence that the situation in regard to telephone development was in a seriously backward state throughout the whole of the rural districts. Every assistance ought to be given to doctors and to nurses

in rural areas to get the telephone as cheaply as possible. He believed that the Minister of Health had a fund which was devoted to assisting nurses and doctors to get the telephone, and he asked the right hon. gentleman to see that the existence of that fund was made known.

Mr. ATTLEE (Postmaster-General), replying to the debate, said that the points raised by Major Lloyd George would be looked into. He agreed that one of the best ways of booming telephones was to give a good service. The growth of the use of the telephone in rural areas was even greater than in urban areas. In the last 18 months 4200 call offices had been opened in rural areas. That showed that something was being done to make up the leeway.

MEDICAL OFFICERS IN THE AIR FORCE.

On Tuesday, March 24th, the House of Commons considered the Estimates for the Royal Air Force on Report.

Lieut.-Colonel FREMANTLE called attention to the serious position in regard to the deficiency in the supply of medical officers.

Mr. MONTAGUE (Under Secretary of State for Air) said he would like to say very emphatically that although it was true that there was a deficiency in the number of regular medical officers available, it was also true that there was no actual deficiency in the medical service, because the deficiency of regular medical officers was, in large part at any rate, made up by the employment of short service officers on a commissioned or a civilian basis. The subject of the shortage of medical officers in the Services had been referred to a Departmental Committee which would proceed to examine the question as quickly as possible. Recruitment of young medical officers from the Dominions and Colonies was under consideration. He was not prepared to admit the serious statements of Colonel Fremantle with regard to the future of medical officers in the Air Force. Those officers who left the service after their short service commission expired received a substantial gratuity, and those who remained might become permanent medical officers with a good career before them. Vacancies in the permanent commissioned ranks were filled by selection from those who had been recruited as short service officers.

The Report of the Vote was agreed to.

HOUSE OF COMMONS.

THURSDAY, MARCH 19TH.

Nurses Employed in Isolation Hospitals.

Mr. GEORGE HIRST asked the Home Secretary whether he had considered the resolution passed and sent to him by the Wath, Swinton, and District Joint Hospital Board with reference to nurses and other persons employed at isolation hospitals; and whether he would consider amending the Workmen's Compensation Act to include them or what action he intended taking in the matter.—Mr. CLYNES replied: The resolution asked for such an amendment of the Act as would bring infectious diseases within the provisions relating to industrial disease. This would involve a big extension of the general scope of the Act, and all I can promise is that it will be noted for consideration when the opportunity comes for a revision of the Act.

MONDAY, MARCH 23RD.

Spotted Fever and Vaccination.

Mr. GROVES asked the Secretary for War whether, in view of the admitted association of vaccination with at least one form of cerebro-spinal disease, of the fact that children and soldiers had been found to show a special susceptibility to cerebro-spinal meningitis, and of the fact that investigations by the Rolleston Committee on Vaccination into the subsequent history of 355 recently vaccinated or revaccinated cases showed an increased susceptibility to illness generally, as compared with the corresponding control cases amongst them, he would reconsider the vaccination regulation as imposed on recruits with a view to testing the effect of its abrogation both on the flow of recruits and on the after health of the men enlisted.—Mr. T. SHAW replied: I am advised that, so far as is known, there is no relationship between cerebro-spinal fever and vaccination, nor is there any relationship between any form of cerebro-spinal disease, the causation of which has been associated with vaccination, and cerebro-spinal fever. I am further advised that there is no evidence that the present procedure in regard to vaccination affects adversely the flow of recruits or the after health of the men enlisted. There are, therefore, no grounds for altering the present rules as regards vaccination which are designed to protect the troops from small-pox—a disease which is prevalent in many of the countries in which the Army is called upon to serve.

TUESDAY, MARCH 24TH.

Dried Condensed Milk.

Mr. TURTON asked the Secretary to the Overseas Trade Department what countries prohibited the importation of dried condensed milk.—Mr. W. R. SMITH (Parliamentary Secretary to the Board of Trade) replied: I understand the question relates to dried milk or milk in a powdered form. I am advised that the term "condensed milk" is not usually applied to these products. According to the information available, the importation of dried milk is prohibited in Australia. In the other British Dominions, in India, and in many British Colonies and foreign countries, the importation or sale of milk preparations not containing prescribed minima of milk fats, &c., is prohibited.

Health of the Mercantile Marine.

Mr. THOMAS LEWIS asked the President of the Board of Trade if he would issue a statement showing what progress had been made by the committee set up over 18 months ago to consider and advise on any questions affecting the health of the mercantile marine.—Mr. W. GRAHAM replied: I would refer my hon. friend to the answer given on Feb. 10th. I would add that since that date the Committee has dealt with proposals for a new scale of medical equipment for passenger ships, recommendations as to the medical equipment of coastal vessels, and the revision of the pamphlet dealing with the prevention and treatment of malaria on board ship.

Share Fishermen and Health Insurance.

Major MCKENZIE WOOD asked the Secretary for Scotland approximately the number of share fishermen in Scotland who had taken out national health insurance cards; and what steps he had taken to ensure that all share fishermen were stamping cards.—Mr. JOHNSTON (Under Secretary for Scotland) replied: I have no means of saying how many share fishermen have become insured persons in Scotland. Like any other members of the insured population, share fishermen are free to join whichever societies are prepared to accept them. It is estimated, however, that there are approximately 20,000 share fishermen in Scotland and the Department of Health are satisfied that there is general compliance with the requirements of the National Health Insurance Act of 1928, under which share fishermen, at their own request, were brought within the scope of compulsory health and pensions insurance for the first time. As regards the latter part of the question, the Department's Inspectors are exercising a close supervision at the various fishing ports in order to ensure that the Act is being complied with.

DONATIONS AND BEQUESTS.—Among other bequests the late Miss Isabel K. Gordon, of Montrose, left £6000 each to the Aberdeen University and the Aberdeen Royal Infirmary; £2000 to the Montrose Royal Infirmary; £1000 to the Edzell Convalescent Home; and £300 to the Victoria Hospital for Consumptives, Edinburgh.

SUSSEX PROVIDENT SCHEME.—Under this scheme £15,339 has been remitted to various hospitals in Sussex and other coöperate agencies. In its initial year, 1921, the scheme produced £332. During the ten years since then over £73,000 has been paid to the various institutions and agencies for services rendered to subscribers. The Royal Sussex County Hospital last year received £5764; the Royal Alexandra Hospital for Sick Children, £2039; the New Sussex Hospital for Women and Children, £1546; Haywards Heath Hospital, £901; Hove Hospital, £710; Sussex Maternity and Women's Hospital, £644; Sussex Eye Hospital, £541; Brighton and Hove Dental Hospital, £355; Sussex Throat and Ear Hospital, £274; Uckfield Cottage Hospital, £247; Buchanan Hospital, St. Leonards-on-Sea, £210; Royal East Sussex Hospital, Hastings, £126; Lady Chichester Hospital, Hove, £107. Five other hospitals in Sussex participated in smaller sums, and, in addition, the sum of £546 was paid to the Brighton Corporation; and £263 to the Brighton, Hove and Preston Nursing Association. Under the heading of refunds to subscribers for treatment at non-coöperating hospitals and benefits under a supplementary section, was the sum of £622.

NOTES, COMMENTS, AND ABSTRACTS

SLEEPING SICKNESS IN AFRICA.

THE shortage of officers in the Royal Army Medical Corps, on which we commented in a leading article last week, gives a special significance to two recent papers on its work on sleeping sickness in Africa.

Writing on Three Years in Central Angoniland with the Sleeping Sickness Commission,[1] Major-General D. Harvey's avowed object is to show that the medical officer's duties in the Army in peace-time are not confined to sick parade and office work, but may include travel, sport, and scientific research, on which may depend the future of whole provinces of the Empire. General Harvey's commission went out to Nyasaland in 1911, in consequence of the detection of trypanosomiasis in that area, and its chief object was to discover the mosquito responsible, since *Glossina palpalis*—already recognised as the carrier in Uganda—was not known to exist in Nyasaland. The result of the commission's work was to show that *G. morsitans* was the carrier of a type of trypanosome identical with the Rhodesian type, and the story of the research is a fascinating one.

Even more interesting, perhaps, is Major G. K. Maurice's account of Sleeping Sickness in the Sudan.[2] The authorities there were fully alive to the danger, having been warned by the appalling results of the disease in Uganda, where the population of the lake district was reduced from 250,000 to 50,000, and the remainder had had to be evacuated entirely from the fly areas. In 1905 a commission, appointed for the purpose, made recommendations to prevent infected natives from crossing from the French and Belgian territory adjacent, but in spite of the cordon sanitaire which was established, some 70 cases occurred in the province of Bahr-el-Ghazal, though none of them was of Sudanese origin. By 1910 the Sudan could be said to be free from sleeping sickness.

In June, 1910, however, the Lado enclave was taken over from the Belgian Government and incorporated in the province of Mongalla. By 1913 547 cases had been detected and segregated in this area. Unfortunately, a fresh area of infection was discovered in 1914, coincidently with the depletion of the medical staff owing to the war. It was not until 1919 that a determined effort could be made to detect and segregate infected cases, and Major Maurice relates in detail the measures by which a handful of British and Syrian medical officers succeeded in stamping out the disease and, incidentally, transforming the appearance of the district and the habits of the natives. The plain account makes a thrilling story. The wastage among the British officers was very high. The first senior medical officer left the district worn out in mind and body and unfit to return; the second died three days after reaching Tembura; the third had his health permanently impaired by blackwater fever, while the fourth left the district suffering from repeated attacks of malaria at short intervals. In spite of this, settlements, roads, bicycles, and motor-cars were introduced, not because "any of us minded the discomforts of travel in unopened Africa, but because the discomforts were incompatible with the work which had to be done." By 1928 sleeping sickness had been eradicated in a district five times the size of Wales, by a staff which at no time exceeded one British and six Syrian medical officers, and was usually much less. In the course of the campaign the natives had lost their fear of the white man and had learnt to obey laws. "The task of extirpating a disease had profoundly affected the life of a people."

MEDICAL MEMBERS OF THE L.C.C.

IN the newly-elected London County Council the following seven members possess medical qualifications: Dr. C. W. Brook, N. Southwark (Lab.); Dr. Stella Churchill, S.E. Southwark (Lab.); Dr. S. W. Jeger, Shoreditch (Lab.); Dr. Florence Barrie Lambert, C.B.E., St. Geo. Westminster (Mun. Ref.); Miss Esther Rickards, F.R.C.S. (Lab.); Dr. Adeline Roberts, St. Marylebone (Mun. Ref.); and Dr. Henry Robinson, N. Kensington (Mun. Ref.). Miss Rickards is an alderman. Dr. Roberts and Dr. Churchill have been re-elected. Dr. Lambert is chairman of the Central Public Health Committee and a member of the Midwives Acts Committee. Dr. Roberts is chairman of the Mental Hospitals' Committee and a member of the Housing Committee. Alderman Rickards is on the Public Health and Housing Committees. Dr. Churchill is on the Mental Hospitals Committee. Dr. Robinson is on the Public Health, Parks, and Welfare of the Blind Committees. Dr. Jeger is on the Public Health and Entertainments Committees. Dr. Brook is a member of the Parks and Open Spaces Committee.

WITH A POCKET LENS.

Dr. James Small's little book[1] is intended to open up the vastly interesting region which lies between the microscopical and the naked eye. In 700 line drawings and 200 descriptive paragraphs he sets out what can be seen by any boy or girl with a good pocket lens magnifying ten times, the materials being arranged according to their seasonal availability. All that is needed is a Coddington lens, a pair of tweezers, an old razor blade, and a slip of stiff celluloid. Dr. Small dedicates the book to two small children who wanted to see the insides of things, and it should be of service in providing scope for the youthful inquirer of all ages.

[1] Pocket-Lens Plant Lore, Month by Month. By James Small, D.Sc., F.L.S. London: J. and A. Churchill. 1931. Pp. 224. 5s.

[1] Jour. of R.A.M.C., May, 1930.
[2] Ibid., September and October, 1930.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

HUNTERIAN SOCIETY.
MONDAY, March 30th.—7.30 P.M. (at Simpson's Restaurant 2 and 3, Bird-in-Hand-court, 77, Poultry, Cheapside). Dinner followed by a discussion on the Common Cold. Openers: Dr. E. P. Poulton and Dr. Oliver Heath.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, Hammersmith-road, W.
MONDAY, March 30th.—10 A.M., Gynæcological Ward, Genito-Urinary Operations. Skin Department. 11 A.M., Surgical Ward Visit. 2 P.M., Surgical Ward Visits. Operations. Medical, Surgical, Eye, and Gynæcological Out-patients.
TUESDAY.—9.30 A.M., Operations. 10 A.M., Medical Ward Visit, Dental Department. 11 A.M., Throat Operations. 11.30 A.M., Surgical Demonstration. 2 P.M., Operations, Medical, Surgical, and Throat Out-patients.
WEDNESDAY, April 1st.—10 A.M., Medical Ward Visit, Children's Medical Out-patients. 2 P.M., Operations, Medical, Surgical, and Eye Out-patients. 4.45 P.M., Venereal Diseases Demonstrated.
THURSDAY.—10 A.M., Neurological Department. 11.30 A.M., Fracture Demonstration. 2 P.M., Medical, Surgical, Genito-Urinary, and Eye Out-patients. 2.30 P.M., Operations.

HAMPSTEAD GENERAL AND NORTH-WEST LONDON HOSPITAL.
WEDNESDAY, April 1st.—4 P.M., Dr. H. C. Semon: Treatment of Minor Skin Affections.

MANCHESTER VICTORIA MEMORIAL JEWISH HOSPITAL, Elizabeth-street.
WEDNESDAY, April 1st.—4.30 P.M., Mr. I. Blain: Common Surgical Conditions and Their Treatment in General Practice.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.
TUESDAY, March 31st.—4.15 P.M., Dr. E. D. Gray: X Ray Examination of the Intestine.